BEFORE
THE PUBLIC SERVICE COMMISSION OF
SOUTH CAROLINA

DOCKET NO. 2018-319-E

In the Matter of:	)	
	)	**DIRECT TESTIMONY OF**
Application of Duke Energy Carolinas, LLC	)	**CHRISTOPHER M. FALLON**
For Adjustments in Electric Rate Schedules and	)	**FOR DUKE ENERGY**
Tariffs	)	**CAROLINAS, LLC**

I. INTRODUCTION

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Christopher M. Fallon and my business address is 550 South Caldwell Street, Charlotte, North Carolina 28202.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am employed by Duke Energy as Vice President of Duke Energy Renewables and Commercial Portfolio. I assumed this position on November 1, 2016. Prior to assuming my current position, I was Vice President of Nuclear Development from January 1, 2012 through October 2016.

Q. PLEASE SUMMARIZE YOUR EDUCATION AND PROFESSIONAL QUALIFICATIONS.

A. I hold a Bachelor of Science Degree and a Master of Science Degree in Electrical Engineering from Clemson University. I am a licensed professional engineer in North Carolina.

Q. HAVE YOU EVER TESTIFIED BEFORE THIS COMMISSION?

A. Yes. I have participated in allowable ex-parte briefings on the IRP and GridSouth.

Q. PLEASE DESCRIBE YOUR DUTIES AS VICE PRESIDENT OF NUCLEAR DEVELOPMENT.

A. I was responsible for Duke Energy's overall new nuclear generation strategy, with a strong focus on the pursuit of combined licenses ("COLs") from the Nuclear Regulatory Commission ("NRC"), initially for the William States Lee Nuclear Station Units 1 & 2 in Cherokee County, South Carolina (the "Lee

Nuclear Project" or the "Project"). After the merger with Progress Energy, I assumed responsibility for the development of the Shearon Harris Nuclear Plant Units 2 & 3 in New Hill, North Carolina, and the Levy Nuclear Plant Units 1 & 2 in Levy County, Florida.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. My testimony provides background on the Lee Nuclear Project development activities and preconstruction costs submitted in this case for cost recovery.

Q. DOES YOUR TESTIMONY INCLUDE ANY EXHIBITS?

A. Yes. Attached as Exhibit 1 to my testimony is the "Final Report to the Public Staff of the North Carolina Utilities Commission Independent Investigation of the Prudence & Reasonableness of the Costs Incurred by Duke Energy Carolinas, LLC to Develop the W.S. Lee III Nuclear Plant ("Project") and its Request to Cancel the Project dated January 22, 2018" prepared and submitted by Global Energy & Water Consulting, LLC ("Global Energy"). Global Energy was retained by the North Carolina Utilities Commission ("NCUC") Public Staff to review the Lee Nuclear Project development costs in connection with pending rate proceedings in North Carolina in NCUC Docket No. E-7, Sub 1146. Global Energy found that Duke Energy Carolinas, LLC's ("DE Carolinas" or the "Company") decisions regarding the Lee Nuclear Project costs were appropriate at the time they were made and that the expenditures to obtain the COLs were reasonable and prudent.

Q. WHAT PRECONSTRUCTION COSTS RELATED TO THE LEE NUCLEAR PROJECT DEVELOPMENT IS THE COMPANY SEEKING TO RECOVER IN THIS CASE?

A. DE Carolinas incurred actual preconstruction costs for the development of the Lee Nuclear Project totaling approximately $558 million through June 30, 2018.[1] The costs are specifically made up of Combined License Application ("COLA") Preparation, NRC Review and Hearing Fees, Pre-Construction and Site Preparation, Land and Right of Way Purchases, Supply Chain, Construction Planning and Engineering, Operational Planning, Post COL, Allocated, and Allowance for Funds Used During Construction ("AFUDC") through December 31, 2017. The specific details of the costs have been routinely reported to the Public Service Commission of South Carolina (the "PSCSC" or "Commission") as part of the Company's reporting requirements per the Commission orders approving the Company's decision to incur Lee Nuclear Project preconstruction costs. The Company is requesting Commission approval to recover the South Carolina retail allocable share of the Lee Nuclear Project preconstruction costs.

These actual costs, along with estimated additional expenditures through May 31, 2019, form the basis for the pro forma that serves as the support for the Company's rate requests in this case as presented by DE Carolinas Witness Kim Smith. The total balance for which the Company is requesting recovery from South Carolina retail customers is approximately $125 million.

[1] All costs stated at system total unless otherwise noted.

Q. HOW IS THE REMAINDER OF YOUR TESTIMONY ORGANIZED?

A. The remainder of my testimony is organized as follows:

II. LEE NUCLEAR PROJECT LICENSING BACKGROUND

III. PRIOR COMMISSION DECISIONS REGARDING LEE NUCLEAR PROJECT DEVELOPMENT COSTS

IV. DECISION TO ABANDON THE LEE NUCLEAR PROJECT

V. COST RECOVERY

VI. CONCLUSION

II. LEE NUCLEAR PROJECT LICENSING BACKGROUND

Q. PLEASE BRIEFLY DESCRIBE THE LICENSING PROCESS UNDERTAKEN TO PURSUE NUCLEAR DEVELOPMENT.

A. DE Carolinas has continually included nuclear energy, a proven carbon-free base load technology, as a viable resource in ensuring fuel diversity and reliability for South Carolina customers in its integrated resource planning ("IRP") process. In the middle of the last decade, DE Carolinas along with many utilities across the country, began the process to license new nuclear generation. This effort by DE Carolinas was spurred by what was at the time an environment of high natural gas prices, extreme volatility in natural gas prices, the expected impacts of the 2005 Clean Air Interstate Rule and other possible carbon limiting environmental regulations as well as the positive support for nuclear generation afforded by the Energy Policy Act of 2005 ("EPAct").

To build and operate a new nuclear reactor, DE Carolinas is required to obtain a license under either the new process in 10 CFR Part 52 ("Part 52") or obtain a construction permit and operating license under the previously existing 10 CFR Part 50 ("Part 50") process. Under the new Part 52 process, which DE Carolinas selected to obtain the Lee Nuclear Project COL, the NRC issues a combined operating and construction license, which the NRC describes as a combined license, to applicants. The COL provides a licensee the ability to construct, and upon meeting certain criteria, operate a new nuclear reactor. In addition, the NRC also certifies new nuclear reactor designs, which is particularly important because these certified designs can be referenced by the applicant seeking approval to construct and operate the new reactor rather than having to demonstrate the safety of the designs on its own. The Westinghouse AP1000 Pressurized Water Reactor ("AP1000") design was the first new passive reactor design for which the NRC issued a final design certification.

Although intended to be an improvement over the prior Part 50 licensing process, the new Part 52 licensing process still has a significant lead time when compared to permitting other generation resources such as combined cycle natural gas generation. The long lead time needed for licensing and constructing new nuclear units led DE Carolinas to proactively act to ensure that nuclear generation was available to customers when needed, based on the base load need identified in its IRP.

Q. DID DE CAROLINAS SUBMIT A COMBINED LICENSE APPLICATION WITH THE NRC?

A. Yes. DE Carolinas submitted a COLA with the NRC for two AP1000 reactors on December 13, 2007.

Q. HAS THE NRC ISSUED A COL FOR THE LEE NUCLEAR PROJECT?

A. Yes. On December 19, 2016, the NRC issued COLs for the Lee Nuclear Project under Part 52 that allows the utility to construct the units at the Lee Nuclear Project site and operate the units for 40 years following an NRC finding under 10 CFR 52.103(g) that the acceptance criteria in the COL are met.

Q. IS DE CAROLINAS REQUIRED TO IMMEDIATELY BUILD THE NEW NUCLEAR PLANT IN ORDER TO MAINTAIN THE LEE COL?

A. No. A COL grants permission but does not compel the licensee to build and operate the plant. Nor is there a requirement that DE Carolinas start construction within a specified period of time. The Part 52 license provides the flexibility to start construction at the appropriate time. Once the NRC issues the license, they have made a determination that the reactor design on the selected site provides adequate protection of public health and safety, the environment, and the common defense and security. From time to time, as new information is learned that might affect the safety determination by the NRC, the license may need to be updated to confirm that the design provides protection given the new information. As AP1000 units have proceeded with construction in China and the U.S., numerous design changes to the AP1000 design have been required. Changes that were deferred for post-COL inclusion

into the Lee Nuclear Project licensing basis will need to be incorporated into the Lee Nuclear Project COL for the plant to be constructed. In addition, submittal of an annual Final Safety Analysis Report ("FSAR") update and recurring regulatory reporting are important to maintaining the COL. The license expires 40 years after construction of the new units is completed and the NRC has issued its 52.103(g) findings, as stated previously.

Q. WHAT IS THE CURRENT STATE OF THE LEE NUCLEAR PROJECT?

A. As discussed above, the Lee Nuclear Project has been granted a COL. The COL does not expire and has value for DE Carolinas customers because it eliminates the long-lead time required for nuclear construction projects and preserves the nuclear option for DE Carolinas customers. Thus, the Lee site will continue to be an option for the Company's customers as part of the Company's long-term generation planning efforts. However, at this time, the Company has determined that it is no longer feasible to develop the Project as originally envisioned and has abandoned the project and is only investing those costs necessary to maintain the COL and site at a minimum level. The Company will continue to evaluate both the need for power and the timing for future nuclear and update this Commission through its annual IRP filing.

III. PRIOR COMMISSION DECISIONS REGARDING LEE NUCLEAR PROJECT DEVELOPMENT COSTS

Q. WHEN DID THE COMPANY DETERMINE THE NEED TO BEGIN PLANNING FOR NEW NUCLEAR?

A. Through its Annual Plan process, beginning in 2005, DE Carolinas identified the need for significant capacity additions by summer 2016 and identified nuclear generation as a least cost supply-side alternative to meet part of that need. At the time, there had been renewed interest in new nuclear generation in the United States. This renewed interest was attributable to several factors, including (a) a need for new base load generation capacity over the next decade in many areas of the country; (b) recognition, both internationally and domestically, in the environmental benefits of nuclear generation as the focus on carbon emissions heightened, particularly as climate change regulation received greater consideration; (c) the need for American business and industry, for whom the price of electricity can be a significant component of overall operating costs, to remain competitive in global markets as other countries maintained or even increased their reliance on nuclear generation; (d) rising and often volatile prices associated with the fuels used in fossil generation assets, particularly natural gas but also coal; and (e) increasing concerns about our nation's energy security and energy independence. Because of these factors, the EPAct contained various provisions that encouraged the development of new nuclear generation. At the same time that these exogenous economic factors began to prevail, nuclear generation technology, design, and safety had

improved markedly. The NRC had also made changes to the licensing process (the Part 52 process described above) for new nuclear plants that were anticipated to remove uncertainty and to enhance the efficiency of the licensing process.

Around that same time, in 2006, the South Carolina General Assembly expressed its support of new nuclear generation in its June 1, 2006, Joint Resolution of the General Assembly of South Carolina, "A Concurrent Resolution to Advance the Need for Electric Utilities to Build New Nuclear Power Plants in South Carolina and to Urge the Office of Regulatory Staff ("ORS") and the Public Service Commission to Encourage Such Consideration." H. 5326.

Q. FOLLOWING THE JOINT RESOLUTION, DID THE SOUTH CAROLINA GENERAL ASSEMBLY PASS LEGISLATION REGARDING NEW NUCLEAR CONSTRUCTION AND ADVANCE COMMISSION APPROVAL OF A UTILITY'S REQUEST TO INCUR PRE-CONSTRUCTION COSTS?

A. Yes. S.C. Code Ann. § 58-33-225, effective May 1, 2007, was enacted as part of the Base Load Review Act ("BLRA") and provided that at any time prior to filing an application or a combined application under the BLRA, a utility may file a request with the Commission and ORS to review the utility's decision to incur preconstruction costs for a potential nuclear-powered facility.[2] The

[2] Similar legislation was also passed in 2007 in North Carolina expressly providing for commission approval of a utility's decision to incur nuclear project development costs. *See* N.C. Gen. Stat. §62-110.7.

statute further provided that prudent preconstruction costs must be properly included in the utility's plant-in-service and must be fully recoverable in rates in future proceedings under the BLRA unless the record shows that individual items of cost were imprudently incurred or other decisions subsequent to the issuance of a project development order were imprudently made considering the information available to the utility at the time. In addition, the statute provided that if the utility abandons the project after issuance of a prudency determination, the utility may defer the preconstruction costs and calculate AFUDC on the balance to be recovered in rates in the next general rate proceeding or revised rates proceeding, provided that the utility proves by a preponderance of the evidence, that its decision to abandon the project was prudent. Thus, S.C. Code Ann. § 58-33-225 provided utilities with assurance that the significant costs spent pursuant to a nuclear project development order would be recoverable unless the Commission determines the costs were imprudently incurred. Thus, the BLRA and the North Carolina General Statute § 62-110.7 provided important assurances upon which DE Carolinas relied on in moving forward with its decision to pursue the Lee Nuclear Project COL.

Q. PRIOR TO THE COMPANY'S REQUEST TO CANCEL THE LEE NUCLEAR PROJECT IN 2017 DID DE CAROLINAS' ANNUAL PLANS SUPPORT THE DEVELOPMENT OF THE LEE NUCLEAR PROJECT?

A. Yes**.** In each Annual Plan filed with the Commission between 2006 and 2016 the Lee Nuclear Project continued to be identified as a cost-effective option to meet base load energy needs for customers. It is important to note that over that

period, the date upon which the Lee Nuclear Project was projected to be needed by customers has changed due to a variety of factors that have been thoroughly reviewed through the integrated resource planning process. The earliest need dates forecasted for the two Lee Nuclear Project units in the 2016 Annual Plan were 2024 and 2026.

Q. DID THE COMPANY MAKE ANY FILINGS WITH THIS COMMISSION PURSUANT TO S.C. CODE ANN. § 58-33-225 REGARDING DEVELOPMENT OF THE LEE NUCLEAR PROJECT?

A. Yes. On December 7, 2007, in Docket No. 2007-440-E, pursuant to S.C. Code Ann. § 58-33-225, DE Carolinas filed an Application for Approval of Decision to Incur Nuclear Generation Pre-Construction Costs (the "2007 Application"). In the 2007 Application, DE Carolinas requested approval of its decision to incur the South Carolina allocable share[3] of preconstruction costs of up to $230 million through December 31, 2009 for the Lee Nuclear Project to ensure the project remained an option to serve customers in the 2018 timeframe. At the time, DE Carolinas anticipated incurring preconstruction costs of approximately $70 million through December 31, 2007 and $160 million from the time period January 1, 2008 to December 31, 2009.

[3] The South Carolina allocable share is 24.0911%.

Q. WHAT WAS THE BASIS FOR DE CAROLINAS ESTIMATE OF PRECONSTRUCTION COST FOR THE LEE NUCLEAR PROJECT?

A. The estimate was based on the best information available to the Company at the time and DE Carolinas stated that as information was refined during the development process, the estimate could be substantially impacted, and it would update the Commission accordingly. DE Carolinas explained that no final decision had been made to construct the facility and it would retain significant flexibility to adjust the development and construction plans in light of additional information to be gained in future years.

Q. **DID THE COMMISSION APPROVE THE COMPANY'S REQUEST?**

A. Yes, the Commission issued an order approving the Company's request on June 9, 2008, finding DE Carolinas decision to incur the South Carolina-allocable portion of Lee Nuclear Project pre-construction costs reasonable and prudent. In the 2008 order, the Commission stated that its approval did not constitute approval of the reasonableness and prudence of specific project development activities or recoverability of specific items of cost.

Q. DID DE CAROLINAS FILE ANY SUBSEQUENT PROJECT DEVELOPMENT APPLICATIONS?

A. Yes. On January 7, 2011 in Docket No. 2011-20-E, pursuant to S.C. Code Ann. § 58-33-225, DE Carolinas filed an Amended Project Development Application for Approval of Decision to Incur Nuclear Generation Pre-Construction Costs (the "2011 Application").[4]

[4] The Company sought similar authority from the North Carolina Utilities Commission regarding the North Carolina allocable portion of Lee Nuclear Project development costs.

Q. WHAT DID THE COMPANY REQUEST IN THE 2011 APPLICATION?

A. In the 2011 Application, the Company requested authority to incur additional pre-construction costs of $229 million through December 31, 2013, for a total of $459 million (including Allowance for Funds Used During Construction ("AFUDC")) to ensure the Lee Nuclear Project remained on schedule to serve customer needs in the 2021 timeframe. DE Carolinas noted that the environment for planning the Company's system continued to be dynamic and it was reasonable and prudent for the Company to continue developing the Lee Nuclear Project.

Q. DURING THE 2011 PROCEEDING HAD THE COMPANY MADE A FINAL DETERMINATION TO CONSTRUCT THE LEE NUCLEAR PROJECT?

A. No. Although the Company continued to believe that the Lee Nuclear Project was critical to meet future resource needs, the Company did not make a commitment to build the facility. The Company made clear that to move forward with building the Project, provisions similar to those contained in the BLRA that allow for the recovery of financing costs outside of a rate case would need to be in place in North Carolina. In addition, the COL would need to be in place, and all necessary approvals from state regulators would need to be obtained.

In both the 2007 and 2011 applications, the Company stressed that the Lee Nuclear Project would have been the largest single capital project in the history of the Company and the assurance sought by its application was critical

to the Company's financial well-being and the ability of DE Carolinas' customers to count on a more diverse, greenhouse gas emission-free, generation source.

Q. WHAT WAS THE OUTCOME OF THE 2011 PROCEEDING?

A. During the 2011 proceeding, DE Carolinas reached a Settlement Agreement with the ORS and other intervenors that provided a constructive approach that would allow DE Carolinas to keep the nuclear option available and maintain the current schedule for obtaining a COL from the NRC, which at the time, was anticipated to be received in 2013. The Settlement Agreement provided pre-authorization that the Company could incur costs of up to $75 million without AFUDC, not to exceed $120 million including AFUDC, during the time period of January 1, 2011 through June 30, 2012. Moreover, the Settlement Agreement provided that it was prudent for the Company to continue to incur development costs for the Lee Nuclear Project only to the extent necessary to maintain the current schedule for obtaining a COL to support a commercial operation date for the Project in the 2021-2023 time frame. The parties agreed that the Company must incur only the absolute minimum amount of dollars necessary to keep the nuclear option available and that in any proceeding to recover such costs, the Company must show that the activities it undertook met these requirements.

The Company also agreed to provide (a) a monthly report on the status of legislation to allow for recovery of financing costs outside a rate case in North Carolina, (b) a quarterly report on expenditures and AFUDC; and (c) a

monthly report on the progress of the Company's negotiations to acquire an interest in the V.C. Summer Units 2 and 3. The Settlement Agreement also provided that DE Carolinas agreed that any change in ownership interest, output allocation, sharing of costs or control, and any future option agreements concerning the proposed Lee Nuclear Project would be subject to prior approval of the Commission. The Commission approved the Settlement Agreement in its entirety and issued an order on July 1, 2011.

Q. **ARE RECOVERABLE COSTS GREATER THAN THE AMOUNT PREAUTHORIZED BY THE COMMISSION IN THE 2011 PROCEEDING?**

A. Yes. In order to keep the Lee Nuclear Project as an option within the targeted timeframe the Company exceeded the preauthorized spending level and incurred cost after June 30, 2012. At the time that the 2011 Application was approved, DE Carolinas had projected receipt of the COL in 2013 for the Lee Nuclear Project. As I explain later in my testimony, the capital spending activity after 2013 declined substantially as project development activities continued to be significantly limited to only the minimal amount necessary to keep the nuclear option available. As Dr. Diaz will explain in his testimony, several factors, many of which were outside the control of DE Carolinas, led to a longer licensing period than originally projected.

Q. PLEASE DISCUSS THE FACTORS THAT SUPPORTED CONTINUATION OF PROJECT DEVELOPMENT ACTIVITIES AND OBTAINING THE COL.

A. First, the Project was still shown to be needed by customers. As demonstrated through the IRP process, the Lee Nuclear Project continued to be an economic choice for customers. Over the life of the Lee Nuclear Project, the timeframe for when new nuclear would be needed has necessarily been amended as assumptions in the IRP have been revised. However, up through the 2016 IRP, the Lee Nuclear Project continued to demonstrate its viability as a least-cost carbon free generation option for customers. In addition, one important benefit of DE Carolinas' actions is that having the COL for the Lee Nuclear Project will reduce the lead time required to license new nuclear while at the same time not committing to billions of dollars of project expenditures. By obtaining the license, DE Carolinas has mitigated one of the primary challenges to new nuclear construction in the U.S., which is the time and effort needed to obtain a COL to build and operate a nuclear plant. Having the COL for the Lee Nuclear Project has shortened the total time needed to permit and construct a new nuclear facility, which will benefit customers if nuclear is ever selected in the future to meet customer needs.

Secondly, the resources and effort expended at the point the preauthorization amount was reached made it reasonable and prudent for DE Carolinas to continue its efforts to obtain the COL for the Lee Nuclear Project. At the point at which the preauthorized spending level was reached, DE

Carolinas had spent significant time and resources to develop the COLA and responded to over 595 requests for additional information from the NRC. The Company was also closely working with the NRC to resolve the remaining outstanding licensing issues and had invested significant time and resources towards that end. The investment of those resources would have been lost had the Project been suspended. In addition, DE Carolinas would have forfeited its priority position in the NRC COLA review process and the NRC's limited resources would have been redirected to other projects. Furthermore, we continued to keep the Commission abreast of the schedule receipt of the COL through the IRP process. Indeed, the schedule for receipt of the COL in 2016 is very close to the schedule expectation the Company reported to the Commission in its 2013 IRP. Dr. Diaz will discuss in more detail factors that played into the timing of receipt of the COL. In addition, the bulk of the capital spent towards project development activities declined significantly after 2013 as the Company continued to limit spending to those activities that were necessary to obtain the COL and preserve the Lee Nuclear Project as a generation option in the timeframe established in the IRP.

Q. ARE THERE ANY OTHER IMPORTANT FACTORS THAT SUPPORTED CONTINUING WITH PROJECT DEVELOPMENT ACTIVITIES?

A. Yes. The Company's decision to proceed with Project Development activities was also bolstered by the robust environment for licensing that continued in the United States. After the Commission issued its preauthorization order in 2011,

the NRC issued its final rule on the Design Certification Amendment for the AP1000. Later, in 2012, the NRC granted the Alvin W. Vogtle Electric Generation Plant Units 3 and 4 ("Vogtle") Project, which had become the reference COL project, its license. Moreover, at the time the preauthorized spending level was exceeded and even continuing today, other utilities were pursuing COLs and competing for very limited NRC COLA review resources. Both South Texas Project Units 3 and 4 and Levy Nuclear Plant Units 1 and 2 were issued COLs in 2016 prior to the receipt of the Lee Nuclear Project COL. And since the Lee Nuclear Project COL was issued, Dominion Virginia Power received a COL for North Anna Unit 3 and Florida Power and Light received COLs for Turkey Point Units 6 and 7. To suspend the pursuit of the COL with the NRC because the preauthorization amount had been reached would have eliminated the benefit of DE Carolinas' efforts to decrease the long lead time for new nuclear plant construction when the Company had already completed a significant portion of the requirements necessary to obtain a COL.

IV. DECISION TO ABANDON THE LEE NUCLEAR PROJECT

Q. WHAT IS THE CURRENT STATUS OF THE LEE NUCLEAR PROJECT?

A. Since the COL was issued in 2016, risks and uncertainties to initiating construction on the Lee Nuclear Project have become too great and abandonment of the Project as was originally envisioned is the best option for customers. Significant events outside of DE Carolinas' control have occurred

since the issuance of the COL for the Lee Nuclear Project that have made abandonment the appropriate choice at this time.

In early 2017, Westinghouse announced that it had suffered significant losses from its AP1000 projects in the U.S. and planned to exit the nuclear plant construction business. On February 14, 2017, Toshiba, the parent company of Westinghouse, announced that it would be taking a $6.3 billion write down of its Westinghouse nuclear business. Toshiba's total market capitalization at that time was approximately $8 billion. At the same time, Toshiba announced the resignations of Toshiba's CEO and Westinghouse's Chairman and CEO, and indicated Toshiba's desire to sell all or a part of Westinghouse. On March 29, 2017, Westinghouse declared Chapter 11 bankruptcy. Furthermore, additional costs in the billions of dollars and delays were announced for the two AP1000 plants in Georgia and South Carolina.

Because of the bankruptcy, Westinghouse was unable to proceed with the Engineering, Procurement and Construction contracts it entered to complete the U.S. AP1000 projects, Vogtle Units 3 and 4 in Georgia and the Virgil C. Summer Nuclear Station Units 2 and 3 ("V.C. Summer") in South Carolina. The Vogtle Owners have entered into a Services Agreement with Westinghouse whereby Westinghouse will provide some procurement and engineering support as well as access to the AP1000 intellectual property. The Vogtle Owners entered into a separate construction agreement with Bechtel, a separate contractor, to provide construction services for the Vogtle project. On July 31,

2017, the V.C. Summer owners announced their decision to cease construction of the V.C. Summer project.

Q. WHAT IMPACT DID THE WESTINGHOUSE BANKRUPTCY HAVE ON THE LEE NUCLEAR PROJECT?

A. The AP1000 technology, which is the design utilized for the Lee Nuclear Project, is owned by Westinghouse. For the development of the U.S. projects, Westinghouse had contracted with other firms to form a consortium to share the financial risk of new nuclear plant construction. The consortium entered into Engineering, Procurement and Construction ("EPC") Agreements with the owners of the Vogtle and the V.C. Summer projects to construct the plants and turn over operation of the plants to the utility owners upon construction completion. The expectations of a similar EPC contracting structure formed the basis for the pricing, schedule, and risk allocation for the Company's proposed Lee Nuclear Station included in the Company's IRP. Over time, the consortium membership changed and eventually Westinghouse acquired the interest of its other unaffiliated consortium partner such that it no longer shared the financial risk with an unaffiliated consortium partner. However, Westinghouse was unable to ultimately bear the financial risk of the losses it sustained on the V.C. Summer and Vogtle projects causing it to file for bankruptcy protection.

Westinghouse's exit from the construction business and bankruptcy in 2017 and the subsequent decision to cease construction of the V.C. Summer Project raises significant uncertainty around the cost, schedule, and execution

of construction for future AP1000 nuclear projects. These uncertainties had a direct impact on the ability to initiate construction of the Lee Nuclear Project and contributed to the Company's decision to abandon it.

Q. HAS DE CAROLINAS ABANDONED THE LEE NUCLEAR PROJECT?

A. Yes. On August 25, 2017, the Company filed a letter with the Commission in PSCSC Docket No. 2011-20-E notifying the Commission that it was requesting approval from the NCUC to cancel the Lee Nuclear Project pursuant to N.C. Gen. Stat. § 62-110.7, as a predicate to cost recovery for the project in North Carolina. Shortly thereafter, on September 1, 2017, the Company filed its 2017 Annual Plan with this Commission in Docket 2017-10-E explaining that revised projections indicated that new nuclear baseload capacity was needed only under a carbon-constrained scenario with the assumption of no existing nuclear re-licensing. Even in that scenario, the added capacity would not be needed until much later (in the 2031 and 2033 timeframe) than projected in the 2016 IRP. Thus, the Company explained its decision to abandon the Lee Nuclear Project was based on: (1) the very limited circumstances under which the nuclear capacity would ever be needed; (2) the later need dates if those limited circumstances came to pass; (3) the risks resulting from the Westinghouse bankruptcy and decision to exit the nuclear construction business; (4) the substantial cost increases and schedule delays associated with the Vogtle and V.C. Summer projects, and the subsequent V.C. Summer project abandonment.

In its Order Accepting Stipulation, Deciding Contested Issues, and Requiring Revenue Reduction, in Docket Nos. E-7 Sub 819 and E-7, Sub 1146 dated June 22, 2018 (the "NC DE Carolinas Rate Case Order"), the NCUC approved the Company's request to cancel the Lee Nuclear Project and permitted recovery of the North Carolina allocable share of the Company's investment in the Lee Nuclear Project with some limited exceptions. In light of its decision to abandon the Lee Nuclear Project, the Company is seeking recovery of the Lee Nuclear Project abandonment costs from this Commission for the South Carolina allocable share of the Company's investment.

Q. IS THE DECISION TO ABANDON THE LEE NUCLEAR PROJECT PRUDENT?

A. Yes. Given the costs and risks associated with constructing the Lee Nuclear Project that materialized in 2017, DE Carolinas' decision to abandon the project is prudent. Although DE Carolinas received its COL from the NRC, events shortly thereafter caused the Company to re-evaluate its plans and determine that the Project, as originally envisioned, was no longer in the best interest of customers. The uncertainty around future construction arrangements and cost for an AP1000 unit as a result of the Westinghouse bankruptcy has created an unknown cost to construct and higher level of risk to continue the Lee Nuclear Project at this time. These critical factors, combined with projected low natural gas prices for the foreseeable future, and uncertain near- and longer-term carbon emissions costs, render it no longer beneficial to customers to construct and commence operation of the Lee Nuclear Project before the end of the next

decade. Given these uncertainties facing the project, DE Carolinas believed it was in its customers' best interests to abandon the project. The Company remains committed to clean power and nuclear energy, and the COL and site preparation work can be leveraged should the need for new nuclear arise in the future. DE Carolinas will continue to monitor the Vogtle Project to evaluate risk and project execution strategies

In many ways, DE Carolinas' methodical, deliberate and measured approach to evaluate and pursue new nuclear has provided customers with both the viable option of new nuclear by taking the steps necessary to maintain nuclear as a future option, while also avoiding some of the challenges that have been encountered by early adopting utilities who have already undertaken full construction.

Q. HAS DE CAROLINAS STOPPED PRECONSTRUCTION ACTIVITIES ON THE LEE NUCLEAR PROJECT?

A. Yes. No preconstruction work continues. Rather, the only costs that continue to be incurred by DE Carolinas are those costs necessary to maintain the COL and site in order to provide options for customers in the future.

V. COST RECOVERY

Q. HAS THE BLRA BEEN AMENDED SINCE THE COMPANY RECEIVED THE LEE NUCLEAR PROJECT DEVELOPMENT ORDERS?

A. Yes. Effective July 5, 2018, South Carolina House Bill 4375 amended the BLRA so that the Commission "must not accept a base load review application,

nor may it consider any requests made pursuant to Article 4, Chapter 33, Title 58 other than in a docket currently pending before the Commission."[5] Further, HB 4375 provides that "[t]he provisions of Article 4, Chapter 33, Title 58 are repealed upon the conclusion of litigation concerning the abandonment of V.C. Summer Units 2 and 3."[6]

Q. HOW DO THE 2018 BLRA AMENDMENTS IMPACT THE LEE NUCLEAR PROJECT?

A. While I am not a lawyer, I have been advised that because DE Carolinas does not currently have any requests made pursuant to Article 4, Chapter 33, Title 58 pending before the Commission, it is unable to request recovery of the abandoned Lee Nuclear Project preconstruction costs pursuant to S.C. Code Ann. §58-33-225(G). Nevertheless, the Company continues to comply with the requirements of the project development orders issued under the BLRA provisions by filing update reports pursuant to the terms of the Settlement Agreement.

Q. PRIOR TO THE ENACTMENT OF THE BLRA IN 2008, HAD THE COMMISSION PREVIOUSLY PERMITTED RECOVERY OF ABANDONED PLANT?

A. Yes, I have been advised that prior to the enactment of the BLRA, Commission precedent allowed recovery of prudently incurred abandoned plant cost and that this precedent is still applicable today as an independent basis for recovery

[5] S.C. Code Ann. § 58-33-220 2.A. (2018).
[6] S.C. Code Ann. § 58-33-220 2.B. (2018).

separate from the recovery provisions previously available to the Company under the BLRA. The Company also appropriately relied upon the Commission's orders in Docket Nos. 2007-440-E and 2011-20-E finding its decision to incur preconstruction costs for the Lee Nuclear Project as prudent. Thus, the Company respectfully requests that the Commission allow it to recover the South Carolina allocable portion of its investment of the Lee Nuclear Project as discussed further below.

Q. WHAT COSTS RELATED TO THE LEE NUCLEAR PROJECT IS THE COMPANY SEEKING TO RECOVER IN THIS CASE?

A. The total estimated balance of cost at May 31, 2019 is approximately $559 million for the development of the Lee Nuclear Project. The total estimated balance of $559 million includes AFUDC through December 31, 2017. The Company is seeking Commission approval to recover the South Carolina retail allocable share of approximately $125 million of the total system spend, adjusted for non-depreciable land moved to Land held for Future Use. These costs are specifically made up of COLA Preparation, NRC Review and Hearing Fees, Land and Right-of-Way Purchases, Pre-Construction and Site Preparation, Supply Chain, Construction Planning and Detailed Engineering, Operational Planning, Post COL, Allocated amounts and AFUDC. The specific details of actual costs incurred through September 31, 2018 are included in the table below:

Category of Cost	Dollars Expended through 09/30/18 on System-Wide Basis*
COLA Preparation	$25 Million
NRC Review and Hearing Fees	$110 Million
Land and Right-of-Way Purchases	$44 Million
Pre-construction and Site Preparation	$22 Million
Supply Chain, Construction Planning, and Detailed Engineering	$80 Million
Operational Planning	$5 Million
Post COL	$2 Million
Allocate	$22 Million
AFUDC	$248 Million
Total	$559 Million

*Details may not add to total due to rounding. The South Carolina allocable share is approximately 24 percent.

Company witness Kim H. Smith describes the rate treatment, including the proposed amortization schedule, in her direct testimony filed in this case.

Q. PLEASE DESCRIBE THE COSTS INCURRED AS PART OF THE COLA PREPARATION CATEGORY.

A. This category includes costs related to DE Carolinas labor, expenses and contract support for preparation of the COLA tendered to the NRC on December 13, 2007. The NRC determined the application was suitable for review and docketed the application on February 25, 2008.

Q. PLEASE DESCRIBE THE COSTS INCURRED AS PART OF THE NRC REVIEW AND HEARING FEES CATEGORY.

A. This category includes the cost of the NRC review fees, DE Carolinas labor and expenses, contract labor and legal support required to support the NRC review of the Lee Nuclear Station COLA, and preparation for the Advisory Committee on Reactor Safeguards Subcommittee Hearing. This category also includes interactions with South Carolina Department of Health and Environmental Control and the U.S. Army Corps of Engineers ("USACE"), as required to move the environmental permit applications forward. The Lee Nuclear Project received the National Pollutant Discharge Elimination System Operations permit on July 17, 2013. The Final Environmental Impact Statement was issued by the NRC on December 23, 2013, and the 401 Water Quality Certification was issued on January 2, 2014. The Final Environmental Impact Statement prepared by the U.S. Forest Service to support mitigation activities in Sumter National Forest was issued on December 5, 2014. The Lee Nuclear Station received its USACE 404 Permit on September 29, 2015.

Q. PLEASE DESCRIBE THE COSTS INCURRED AS PART OF THE LAND AND RIGHT-OF WAY PURCHASES CATEGORY.

A. This category includes the purchase of land required for the Lee Nuclear Project site and rail rights-of-way. This category also includes the cost of purchasing additional land for a supplemental cooling pond in event of severe drought, as well as costs for surveying the selected transmission right-of-way.

Q. PLEASE DESCRIBE THE COSTS INCURRED AS PART OF THE PRE-CONSTRUCTION AND SITE PREPARATION CATEGORY.

A. This category includes site activities to both maintain the site and prepare the site for construction. Site preparation activities included: dewatering and cleanup of the excavated area, site remediation activities required to identify and properly dispose of hazardous wastes, and costs associated with the demolition and removal of unusable structures. Necessary maintenance of existing rail bed and required Make-up Pond B spillway repair were completed. Engineering of offsite infrastructure for potable water, sewer, and rail spur, and geotechnical evaluations (needed for engineering) have been completed. Engineering for bringing communications to the site is also included in this category. Engineering of necessary traffic improvements was brought to 85 percent completion by December 2013. Ongoing and continuing activities include: site security, utilities and miscellaneous site maintenance.

Q. PLEASE DESCRIBE THE COSTS INCURRED AS PART OF THE SUPPLY CHAIN, CONSTRUCTION PLANNING AND DETAILED ENGINEERING CATEGORY.

A. This category includes activities associated with working with the AP1000 consortium to negotiate an EPC agreement. Negotiations in 2008 did not result in an executed contract because DE Carolinas was unable to come to terms on a number of issues, most prominently cost and risk sharing. After the EPC negotiations broke down, DE Carolinas decided to hold off on future EPC discussions until after receipt of the COL when the project schedule could be

better defined. In preparation for future EPC negotiations and to better define the project scope and reduce risk for customers, conceptual site-specific engineering and construction planning activities necessary to develop a complete project definition were continued and are included in this category. Continuing construction planning activities serve to further develop construction plans and keep the construction plans in line with the latest engineering. Detailed site-specific engineering began in January 2011 and was brought to 70 percent completion in December 2013. Commercial building design activities started in June 2012, and design of the first six commercial buildings was completed in December 2013. These activities were necessary to preserve the on-line date based on the anticipated need identified for the Lee Nuclear Project in the DE Carolinas IRP.

Q. PLEASE DESCRIBE THE COSTS INCURRED AS PART OF THE OPERATIONAL PLANNING CATEGORY.

A. This category includes activities associated with emergency planning ("EP"), operator and plant staff training, including costs associated with the Knowledge and Abilities Catalog, required for operator license examinations for AP1000 plants, and the standardization of the nomenclature in the Westinghouse Master Equipment List, supporting operations program development, such as Quality Assurance Program, and the review of approximately 500 procedures. In 2011, the NRC issued a final rule (76 FR 72560) amending certain EP requirements in the regulations that govern domestic licensing of production and utilization facilities (the "EP Final Rule"). The operational planning team was instrumental

in developing the DE Carolinas response to the EP Final Rule and these costs are included in this category. The training materials, operational programs, and operating procedures are all being developed in concert with other AP1000 utilities within the AP1000 Group LLC ("APOG LLC") framework. APOG LLC was established for the purpose of providing technical, engineering and procurement support services to the members and their licensing, development and construction of AP1000 power plants. APOG LLC was the means to share the cost of engineering and licensing activities between members to lower the overall cost for each member. The Operational Planning category also includes generation of administrative procedures that must be in place upon receipt of COL from NRC.

Q. PLEASE DESCRIBE THE POST COL CATEGORY.

A. As previously discussed, the COL was received in December 2016. Design finalization and first-of-a-kind construction issues at V. C. Summer and Vogtle have required Westinghouse to make numerous changes to the AP1000 design. Design changes continue to be issued as the lead plants advance toward completion. Submittal of an annual FSAR update and recurring regulatory reporting are required to maintain the COL.

Q. PLEASE DESCRIBE THE ALLOCATE CATEGORY.

A. This new category of cost relates to labor burdens and allocated labor costs. In prior reporting this category had been manually spread to create cost status reports. DE Carolinas determined that it is more accurate to show these charges in a separate bucket and began reporting in this manner on November 21, 2017.

Q. PLEASE DESCRIBE THE AFUDC CATEGORY.

A. AFUDC costs are the financing costs (both debt and equity) on the capital dollars incurred on the Project once the Project costs began being recorded to FERC Account 107, Construction Work in Process.

Q. WHAT COSTS HAS THE COMPANY INCURRED FOR THE LEE NUCLEAR PROJECT?

A. DE Carolinas has incurred a total of approximately $558 million in cost for project development activities through September 30, 2018. As discussed in DE Carolinas Witness Kim H. Smith's testimony, DE Carolinas is requesting Commission approval of the South Carolina allocable share of the Lee Nuclear Project spend through September 30, 2018 including projected costs through May 31, 2019, which total approximately $518 million after non-depreciable land is moved to Land held for Future Use.

Q. WHAT COSTS DID THE COMPANY INCUR PURSUANT TO THE 2008 AND 2011 LEE NUCLEAR PROJECT DEVELOPMENT ORDERS?

A. Of the total $350 million authorized by the Commission through the 2008 and 2011 Lee Nuclear Project Development Orders, DE Carolinas incurred approximately $251 million during the authorized time periods in the orders.

Q. PLEASE EXPLAIN ANY COSTS INCURRED OUTSIDE THE TIMEFRAMES AUTHORIZED IN THE LEE NUCLEAR PROJECT DEVELOPMENT ORDERS.

A. In 2010, the Company incurred approximately $36 million of Lee project development costs. As previously explained, DE Carolinas requested approval

of its decision to incur these costs in its 2011 Application; however, the Company reached a Settlement Agreement with ORS and some of the intervenors, and the Commission approved the Company's decision to incur costs, not to exceed $120 million including AFUDC, during the time period of January 1, 2011 through June 30, 2012. From July 1, 2012 to September 30, 2018, DE Carolinas incurred approximately $271 marmillion in additional Lee Nuclear Project development costs.

Q. DID DE CAROLINAS TAKE STEPS TO LIMIT WORK PERFORMED ON THE PROJECT TO THE MINIMAL AMOUNT NECESSARY TO KEEP THE NUCLEAR OPTION AVAILABLE?

A. Yes. As a result of the Commission's approval of the 2011 Application, DE Carolinas began limiting its activities to only those activities and costs necessary to obtain the COL and to keep the nuclear option available in the targeted timeframe identified in the IRP. The Company did not order equipment and wound down non-essential site-specific work, and construction planning activities. The Company completed its contractual commitments in areas that were no longer necessary and deliberately narrowed the scope of work to reduce costs. Rather than immediately terminate contracts with contractors and incur termination costs, the Company wound down contracts in an orderly manner that preserved the work in a position to efficiently resume at a later date. The Company's intent was to reduce costs to only those necessary, while preserving

the ability to resume work once the COL was received and the Company decided to move forward with the project.

Q. WERE ALL THE COSTS INCURRED FOR THE LEE NUCLEAR PROJECT REASONABLE AND PRUDENTLY INCURRED PROJECT DEVELOPMENT COSTS?

A. Yes. As further discussed and explained also in the testimony of DE Carolinas Witness Nils J. Diaz, the costs incurred to obtain a COL for the Lee Nuclear Project were reasonably and prudently incurred project development costs undertaken to ensure a diverse, cost effective and reliable supply of energy for DE Carolinas' retail customers.

Q. HAVE THERE BEEN ANY OTHER ANALYSES OR FINDINGS REGARDING THE PRUDENCE OR REASONABLENESS OF THE LEE NUCLEAR PROJECT DEVELOPMENT COSTS?

A. Yes. The NCUC Public Staff reviewed the Lee Nuclear Project development costs in connection with pending rate proceedings in North Carolina. There, the Public Staff retained Global Energy to assist in the review of those costs and I have included their final report to the Public Staff as Exhibit 1 to my testimony. The Public Staff concluded that costs incurred by DE Carolinas in pursuit of the COL, including costs associated with pre-construction and site development, land and right-of-way purchases, supply chain, construction planning and detailed engineering, operational planning, and post-COL costs were reasonable and prudent with little exception.

VI. CONCLUSION

Q. DOES THIS CONCLUDE YOUR PRE-FILED DIRECT TESTIMONY?

A. Yes.

Final Report

to the

Public Staff - North Carolina Utilities Commission

Independent Investigation of the Prudence & Reasonableness

of

Costs Incurred by Duke Energy Carolinas, LLC

to

Develop the W. S. Lee III Nuclear Plant ("Project")

and its

Request to Cancel the Project

January 22, 2018

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SECTION 1.0: INTRODUCTION

Global Energy & Water Consulting, LLC ("Global or Consultant"), has been retained by the Public Staff - North Carolina Utilities Commission ("Public Staff") to assist with a review of the prudence and reasonableness of approximately $353M in costs (North Carolina retail jurisdictional costs only, including AFUDC) incurred by Duke Energy Carolinas, LLC ("DEC"), to develop the proposed W. S. Lee III Nuclear Plant ("WSL"), as well as DEC's request to cancel the Project. DEC received from the Nuclear Regulatory Commission ("NRC") a Combined Operating License on December 19, 2016. DEC filed a Request for Approval to Cancel the Project in Docket No. E-7, Sub 819, on August 25, 2017. DEC also filed a request to recover costs of the Project in a request for base rate increase in Docket No. E-7, Sub 1146, also filed on August 25, 2017. Subsequent to the filing to cancel the project and request to recover costs, the Public Staff entered into a contract with Global and our team of consultants to assist Public Staff with the prudence review.

The Global Team consists of Dr. William Jacobs, PE, Mr. George Evans, and Mr. Mark Crisp, PE. The members of the Global Team, both individually and as a team have been involved with reviews of Combined Operating License Applications ("COLA"), AP-1000 budgets and schedules, technology selection, integrated resource planning ("IRP") filings, and construction progress, as well as contracting issues at V. C. Summer (SCANA), Vogtle (Southern Nuclear – Georgia Power), Turkey Point (Florida Power & Light), and Levy County (Progress Energy Florida), among other assignments in the nuclear industry. The focus of the Global assignment has been to review, investigate and assess the prudence and reasonableness of the approximately $353M (North Carolina retail jurisdictional costs) in costs incurred by DEC during the application development process of the COL and filing with the NRC, costs associated with the Land and Right-of-Way Purchases for the site of the WSL plant, costs associated with Pre-Construction and Site Preparation, costs incurred for Supply Chain, Construction Planning, and Detailed Engineering, costs for Operational Planning, and investment financial costs included as Allowance for Funds Used During Construction ("AFUDC") of $155,440,000 (North Carolina retail jurisdictional cost) as of June 30, 2017, based on the DEC filing to the Commission. In addition, we have been charged with reviewing DEC's Termination filing before the Commission.

In order for us to carry out the requirements of our engagement, Data Requests developed by our Team were propounded upon DEC to obtain the necessary information to provide a review of the

decision-making process DEC employed from the project conception up to the point of the filing of its Request for Approval to Cancel and its request for cost recovery before the Commission. In order for our Global Team to offer an opinion on the prudence and reasonableness of decisions and costs by DEC, we formed our position based on the preponderance of supportable documentation provided by DEC and the definition of prudence and reasonableness. The Public Staff provided us with the following language to guide our consideration of prudence:

> …the standard for determining the prudence of the Company's actions should be whether management decisions were made in a reasonable manner and at an appropriate time on the basis of what was reasonably known or reasonably should have been known at that time. The Commission agrees that this is the appropriate standard to be used in judging the various claims of imprudence that have been put forth in this proceeding…and adopts it as the standard to be applied herein. The Commission notes that this standard is one of reasonableness that must be based on a contemporaneous view of the action or decision under question. Perfection is not required. Hindsight analysis -- the judging of events based on subsequent developments — is not permitted.
>
> 78 North Carolina Utilities Commission Report, 238 at 251-52 (1988)

This language is consistent with our experience in similar regulatory cases including other public utility commission's findings regarding prudence and the standard of proof necessary to support determinations of prudence. In our review, we looked at the following six (6) considerations:

- What data was available at the time of decision-making, as well as, management systems and procedures implemented to enable appropriate analysis.
- The effectiveness of the flow of information and whether data was communicated in a manner that facilitated sound decision-making.
- How the information was evaluated; whether the data was interpreted accurately; what alternatives were evaluated; and whether or not sound decisions or conclusions were drawn to meet the needs of the project, corporate entity, and the ratepayer.
- Whether or not decisions were made in a transparent manner with full participation.
- Whether or not these decisions were monitored and readdressed as necessary with changing conditions.
- Whether or not changes were communicated satisfactorily to all parties.

Of significant importance in our review was the first consideration, what data (information) was available ***at the time of decision-making*** (Emphasis added). A determination of prudence is not based on the final outcome of the work process. It is specifically confined to decisions made based on the data available or that should have been reasonably available to the utility at the time of the decision-making.

During the later years of the project, prior to the decision to terminate the project, DEC's IRPs provided updates on the Company's continued actions to obtain a COL and indicated that new nuclear generation was "a carbon-free, cost-effective, reliable option within the Company's resource portfolio." (*See* DEC 2014 and 2016 IRP) The Commission issued Orders approving DEC's IRPs. This is consistent with DEC's position that maintaining the COL had value and DEC should continue to engage with the NRC to formally maintain the "Status Quo" (NCUC Order dated August 5, 2011, Ordering Paragraph 1). The "Status Quo" for DEC was defined under that Order by the requirement that DEC "incur only those nuclear project development costs that must be incurred to maintain the status quo with respect to the Lee Station, including Duke's COL application at the NRC." The Order of the NCUC appears to indicate that the Commission found it appropriate for DEC to continue on its current trajectory of pursuing the COL from the NRC. As added direction for our team concerning the meaning of the term "status quo", we relied on our own experience in previous regulatory cases and the specific definition of "status quo" as published by both Merriam-Webster and Black's Law Dictionaries to be *"maintaining the existing state of affairs."* Our professional experience supports this definition and further supports DEC's continued efforts to obtain a COL. In order to accomplish this task, not only was it necessary for DEC to continue its legal and administrative duties to work with the NRC to resolve all outstanding issues with its application but, just as importantly, DEC needed to continue to pursue permitting, pre-construction, engineering design, construction planning, and operational planning. Discontinuing effort in any one of these areas would have signaled to the NRC that DEC was not actively pursuing the COL, and could have resulted in termination of the COL review process by the NRC prior to its issuance of the COL. The existing COL possesses value and can be used to pursue the option to build a nuclear plant at the WSL site if conditions warrant in the future.

SECTION 2.0: EXECUTIVE SUMMARY

Global Energy & Water Consulting, LLC was awarded a contract on October 10, 2017, to support the Public Staff with its review of the prudence and reasonableness of approximately $353M (North Carolina retail jurisdictional costs) incurred by DEC to develop the WSL Plant. Global immediately began its investigation by reviewing previously filed documents and testimony in Docket No. E-7, Subs 819 and 1146 and DEC's responses to data requests. The goal of our analysis was to provide the Public Staff with our professional analysis and opinion as to whether DEC's expenditures for the pre-construction of the WSL Plant were prudent and reasonable, along with our professional opinion concerning DEC's request to cancel the Project.

After careful consideration and thorough review of all public and confidential data made available to us, documents filed with the NCUC, filed testimony, review of data responses that covered the 2006 – 2016 time period, and our professional experience with other utilities in the Southeast concerning the development of the Westinghouse AP 1000 nuclear units, we have concluded that DEC's decisions were appropriate at the time they were made. We found the expenditures to obtain the COL to be reasonable and prudent within the limits of the definitions of reasonableness and prudence. We also found the costs incurred for pre-construction and site development, land and right–of-way purchases, supply chain, construction planning and detailed engineering, operational planning and post-COL to be reasonable and prudent, as well, subject to an issue raised by the Public Staff concerning the Visitors' Center. Additionally, the Public Staff is also examining issues involving AFUDC. It is worth reiterating at this point that all of DEC's decisions were reviewed on the basis of the knowledge that DEC had, or reasonably should have had, based on the contemporaneous information available, at the time of its decisions. A determination of prudence does not involve, nor should the determination be subjected to, a review of information that was not available to DEC at the time its decisions. Therefore, it is our opinion that all costs associated with the application for the COL and subsequent costs should be deemed prudent and reasonable, subject to the recommendation of the Public Staff on the costs of the Visitors' Center and issues involving AFUDC.

Our review of the project development costs for obtaining the WSL Plant COL concluded the dollars spent by DEC were similar in nature to project development costs we reviewed in SCANA's V. C. Summer Units 2 & 3 Baseload Review Act (South Carolina); in Southern Nuclear-Georgia Power's Alvin W. Vogtle Units 3 & 4; and in the COL Application of Florida Power & Light's Turkey Point Units 6 & 7.

While it is virtually impossible to perform a side-by-side comparison of costs by category, the total outlay of dollars can be reasonably compared. For example, DEC closed out the accrual of costs in the COLA Preparation category at the time the Application was accepted by the NRC. However, the cost category for "NRC Review and Hearing Fees" appropriately continued to capture costs. The NRC costs post-COL Application are nearly 100% associated with the NRC review of the application, efforts to respond to NRC requests for additional information ("RAI"), NRC review and approval of design changes, as well as modifications to the application due to external factors as determined by the NRC. Therefore, in DEC's case, the cost to obtain the COL is almost entirely composed of dollars booked to the NRC Review and Hearing Fees account and to COL Preparation account.

Comparing the costs of the COL for DEC of $275M+, including a pro rata share of AFUDC, with costs from SCANA, Southern Nuclear, and FP&L ($286M, $300M, & $330M, respectively)[1] indicates DEC's costs to be well within the realm of similar costs reported by other southeastern utilities, and in fact, tend towards the lower boundary of the composite cost. However, it would be inappropriate to attempt to make a direct comparison of such costs, as each of these utilities account for particular work tasks in somewhat different manners, according to their own internal accounting procedures, requirements of their specific state regulatory authorities, and certain requirements established by their regulatory authority with regards to AFUDC, return on equity ("ROE"), and the weighted average cost of long-term debt used to establish AFUDC. However, it is appropriate to compare the total cost of obtaining the COL across these utilities. Other external activities that also affect the "cost" of obtaining the COL include: the quality of the work performed by the individual utility or its contractor(s) and how this effort is accepted by the NRC. In the case of DEC, it appears that the quality of the application and the review by the NRC was performed without a significant volume of "rework" that would typically drive up the cost of the COL. It must be pointed out that during the time that DEC's application was before the NRC, the NRC promulgated a significant volume of revisions and design changes to address safety related issues and "lessons learned" from the 2011 Fukushima accident.

In addition to the cost evaluation, we were tasked with the analysis of DEC's decision to select nuclear generation as the next baseload resource to add to its generation fleet, and whether or not this decision was in the interest of the Ratepayer. The genesis of this decision dates back as early as 2004 in

[1] Actual line item costs used to develop a total cost to obtain a COL are not available as such level of cost detail is protected by Confidentiality Agreements that are within the regulatory purview of each utility and its State regulator.

DEC's annual IRP filings with the NCUC. These IRPs modeled current loads and future load forecasts, existing generation fleet operating criteria, existing and future cost of generation resources, fuel cost forecasts, and known and anticipated costs of environmental compliance. In short, we thoroughly reviewed and analyzed each of the confidential IRPs filed by DEC with the NCUC from 2005 through and including 2017, with particular focus on DEC's decision to pursue a COL with the NRC for the WSL Project. In addition, we evaluated DEC's responses to all discovery requests from the Public Staff related to these IRPs.

In summary we concluded that DEC's pursuit of the COL for the WSL Project was reasonable and prudent. Absent the COL, under circumstances known at the time, DEC would have been in an untenable and precarious situation regarding fuel diversity and the ability to reduce carbon dioxide ("CO_2") emissions. During this period of time, there was extensive pressure, both politically and publicly to reduce the CO_2 and nitrous oxide ("NOx") constituents of fossil fuel emissions. The Obama Administration was proposing new heightened compliance regulations through the Clean Power Plan ("CPP"). There were also new state-level criteria for particulate matter, mercury, and other point source constituents. However, no formal, uniform "energy plan" was developed on which a utility could base its planning process. Therefore, it was necessary for DEC to make its best estimate as to the criteria that would govern decision-making during the planning horizon. As such, nuclear energy was a baseload generation source that fit the criteria for low particulate and gaseous emissions, while providing sustainable and reliable fuel diversity. At the time of its decision to plan for the addition of baseload generation resources to its generating fleet, nuclear generation was a reasonable option for planning purposes.

SECTION 3.0 EVALUATION OF COSTS BY TASK DESCRIPTION:

Throughout our analysis, the best method for us to audit costs was by maintaining the same categories DEC had developed to submit its analysis to the Commission for its semi-annual filing requirements established in ordering paragraph 4 of the Commission's August 5, 2011, *Order Approving Decision to Incur Limited Project Development Costs* in Docket No. E-7, Sub 819. The costs were tracked in the following eight (8) categories, and also shown in Table 1:

- COLA Preparation
- NRC Review & Hearing Fees
- Land and Right-of-Way Purchases
- Pre-construction and Site Preparation
- Supply Chain, Construction Planning, and Detailed Engineering
- Operational Planning
- Post COL
- AFUDC

Due to time and resource constraints, we elected to sample costs from a population that would support a statistical finding of 95% confidence, based on total dollars. We limited our review to the costs associated with tasks associated each of the eight (8) major cost categories listed above. Review of these costs can provide an additional level of confidence. If reasonableness and prudence is established for these cost groupings, we would then expect that an analysis of all cost groupings and cost categories to satisfy the same reasonableness and prudence. As an example, Enercon Consulting performed individual work tasks in each of the seven (7) non-AFUDC cost categories. They assisted with the COL Application. They also performed tasks supporting NRC Review and Hearings, Land and Right-of-Way Purchases, and Pre-construction, Supply Chain and Operational Planning. Since these costs supported the construction effort, AFUDC was accrued for these costs. Therefore, a thorough evaluation of these cost groupings provided a "statistical view" of the costs and decisions for all cost categories. In

addition to our specific cost analysis, we also performed a parallel review of costs and budgets to detailed information provided in various Data Requests. These documents include one hundred (100) integrated project reports authored by DEC, along with nearly 80 monthly status reports authored by Westinghouse/Shaw/Stone & Webster.

Section 3.1 – COLA PREPARATION -

> COLA preparation "includes Duke labor, expenses and contract support for preparation of the Combined Construction and Operating License (COL) Application tendered to the Nuclear Regulatory Commission (NRC) on December 13, 2007. The NRC determined the application was suitable for review and docketed the application on February 25, 2008."

The cost category for COLA Preparation included mainly costs incurred by DEC in the early years of the project (up though 2009), including its contractors. These costs were necessary to finalize the COLA and submit it to the NRC. DEC's application for COL was docketed by the NRC in February of 2008; the final COL was issued by the NRC in December 2016. During the time period leading up to February 2008, DEC and its contractors were focused on completing the extensive requirements of the Code of Federal Regulations Title 10, Part 52 (10 CFR Part 52) and NUREG/BR-0298. DEC incurred costs of $27.4M up to and through filing of the license application with the NRC.

Subsequent to the filing, DEC and its contractors also were required to attend NRC hearings, respond to NRC RAIs (over 950 per NRC Staff reports), and make modifications to the COL application. During the same period of time, the NRC Staff expended over 67,000 man-hours on DEC's application. It is not unreasonable to expect that DEC a similar number of man-hours, if not more, developing the responses to the NRC RAIs and other requirements for design changes.

Our analysis of costs and billings provided in response to Data Request #14 shows that DEC clearly documented the costs of obtaining the COL. However, these were not the total costs for the COL, as once the filing had been successfully docketed with the NRC, DEC was required to respond to all questions raised by the NRC Staff and the Nuclear Safety Review Board ("NSRB"). The dollars in the NRC Review and Hearing cost category are included in order to capture all COL-related costs incurred through the issuance of the COL in 2016.

The NRC has captured the costs of the COL Application for seven licensee applications and made that information publicly available. Based on the NRC developed cost figures, the average cost of a COL,

based on those these seven sites, is $29.9M. In the case of WSL Project, DEC spent $27.4M for its application, well within the average of the seven sites.

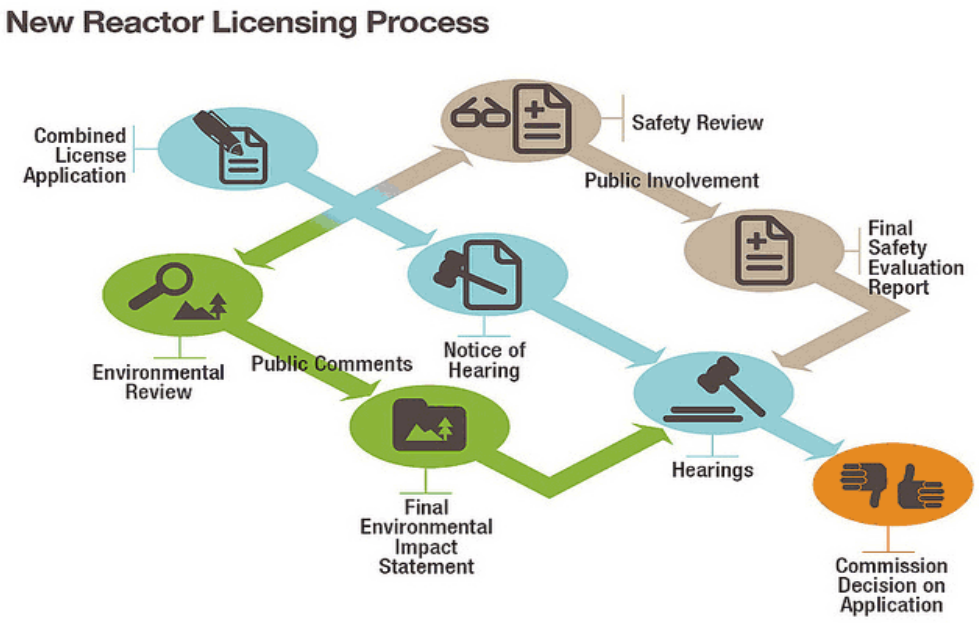
The WSL Project began to accrue costs for the COL Application in August of 2006. These costs were primarily to cover in-house DEC Labor and expenses. There were also costs for outside consulting and supplies. These costs continued until December of 2008 when the application was submitted to the NRC. At the time that the COL costs started to decline, the cost category for COL Review started to accrue costs and continued until the Summer of 2017, even after DEC was granted its COL from the NRC in December 2016. DEC formally submitted its Request for Approval to Cancel the WSL Plant to the NRC on August 25, 2017. DEC's current strategy is to maintain the WSL Project COL until a future time that shows economic and environmental conditions once again indicate nuclear generation to be a reasonable choice for DEC to add to its generating portfolio. Until such time, however, DEC will be required to submit annual updates of its Final Safety Analysis Report ("FSAR"), including any design changes proposed by the NRC. Therefore there will be continuing costs that accrue to the NRC Review & Hearing Fees and to Post COL Licensing cost categories.

Section 3.2 – NRC REVIEW AND HEARING FEES –

> The category of NRC Review and Hearing Fees "includes the cost of the NRC review fees, Duke labor and expenses, contract labor and legal support required to support the NRC review of the Lee Nuclear Station COL application, and preparation for the Advisory Committee on Reactor Safeguards Subcommittee Hearing. This category also includes interactions with South Carolina Department of Health and Environmental Control (SCDHEC) and the US Army Corps of Engineers (USA CE), as required to move the environmental permit applications forward. The Lee project received the National Pollutant Discharge Elimination System (NPDES) Operations permit on July 17, 2013. The Final Environmental Impact Statement was issued by the NRC on December 23, 2013, and the 401 Water Quality Certification was issued on January 2, 2014. The Final Environmental Impact Statement prepared by the U.S. Forest Service to support mitigation activities in Sumter National Forest was issued on December 5, 2014. Lee Nuclear Station received its USACE 404 Permit on September 29, 2015."

The NRC Review and Hearing Fees cost category captures costs associated with the NRC's review of the COL application along with costs for the NRC to hold various internal and public meetings associated with the review and approval process. In support of the internal NRC review of the application, there are externally driven process and regulatory requirements that must also be formalized and approved by the NRC. These externalities include the National Pollution Discharge Elimination System permit, Corps of Engineers 404 Permits, and State and Federal Air Quality & Emission

permits, along with specific State environmental permits that all support the Environmental Review and the Final Environmental Impact Statement (Green Path in the following picture).



The NRC convenes a third party independent Board, the Advisory Committee on Reactor Safety ("ACRS"), to evaluate the overall safety related issues of the technology selected, specific requirements of the AP 1000 certification process, and specific review of the Final Safety Evaluation Report and Advanced Final Safety Evaluation Report ("SER"). NRC employees with specific knowledge of law, engineering, and the nuclear industry are appointed by the Commission to conduct the formal license review process. Their function is held at arm's length from the Commission itself to safe guard their independence and ethical standards. These NRC employee "review boards" assist the Commission with processing and approving applications, as well as reviewing on-going technical issues with the COL and project deployment following the issuance of the COL. The costs of these review boards, public hearings, and Applicant oversight are partially borne by the Applicant through the fees assessed by the NRC Safety Review path in the "New Reactor Licensing Process" figure above).

The NRC also convenes the Atomic Safety and Licensing Board Panel ("ASLBP") that conducts hearings for the Commission. The specific responsibility of the ASLBP as it pertains to the COL process "is to conduct public hearings concerning contested issues that arise in the course of licensing and

enforcement proceedings regarding nuclear reactors and the civilian use of materials in the United States."[2]

As a result of the review and approval process, these costs are appropriately included in the cost of obtaining and maintaining the COL along with the on-going compliance with COL requirements following the award of the COL to the Applicant. A summation of the COL costs and the NRC Review and Hearing Fees provides a much more representative cost of the COL, approximately $150M+ in the case of WSL.

We evaluated specific contracts with Shaw/CB&I/Stone & Webster/Wectec, Enercon Services, and the US Nuclear Regulatory Commission for cost and decision compliance. These three (3) contracts totaled more than $110M. Of particular interest is the contract amount of $24.7M+ for the US NRC, which covered the hearing and various NRC review boards, inspections, etc., and were not in any way negotiable. We also found the costs billed by the Shaw Team and Enercon to be necessary, reasonable, and prudent.

Section 3.3 – LAND AND RIGHT-OF-WAY PURCHASES –

> The category of Land and Right-of-Way Purchases "includes the purchase of land required for the Lee site and rail right-of-ways. Category also includes cost of purchasing additional land for a supplemental cooling pond in event of severe drought as well as costs for surveying the selected transmission right-of-way."

The cost category of Land and Right-of-Way Purchases includes the purchase of the WSL site, as well as subsequent purchases to add additional acreage for necessary cooling and make-up water storage. Because most of the heavy forgings and modular structures were to be delivered to the site via railroad, access rights-of-way for rail service was also necessary. The total accrued cost for Land and Right-of-Way Purchases through June 2017 is approximately $44.6M. 96% ($43M) of this cost was incurred prior to the NCUC imposed requirement for six (6) month financial project reporting updates. The $44.6M in Land and Right-of-Way includes $14M for the purchase of the WSL Project site in 2006 and 2007. Electric generation from WSL Project was to have been interconnected to DEC's existing grid

[2] https://www.nrc.gov/about-nrc/regulatory/adjudicatory/aslbp-respons.html

via overhead transmission lines constructed along purchased rights-of-way, included in in the Land and Right-of-Way Purchases category, but excluded from the $14M purchase of the 1900 acre site, itself.

The Land and Right-of-Way category was essentially closed out as of June of 2014.

Section 3.4 – PRE-CONSTRUCTION AND SITE PREPARATION –

> The category of Pre-Construction and Site Preparation "includes site activities to both maintain the site and prepare the site for construction. Site preparation activities included: dewatering and cleanup of the excavated area, site remediation activities required to identify and properly dispose of hazardous wastes, and costs associated with the demolition and removal of unusable structures. Necessary maintenance of existing rail bed and required Make-up Pond B spillway repair were completed. Engineering of offsite infrastructure for potable water, sewer, and rail spur; and, geotechnical evaluations (needed for engineering) have been completed. Engineering for bringing communications to the site is also included in this category. Engineering of necessary traffic improvements was brought to 85% completion by December 2013. Ongoing and continuing activities include: site security, utilities and miscellaneous site maintenance."

The Pre-construction and Site Preparation category captures the costs for most of the identifying activities that are visible at the site today. It was necessary to begin pre -construction activities prior to the receipt of the COL in order to maintain the schedule for the original Commercial Operations Date ("COD") of 2016 and subsequent later dates as the schedule was revised based on results of IRP analysis. It was also necessary to initiate pre-construction activities to support the Construction Engineering and Detailed Engineering functions. Much of the detailed engineering relied heavily on the findings of the pre-construction and site preparation activities for foundation designs, rail and road designs, infrastructure to support cooling water storage, make up water storage, on and offsite communications and security. These activities had to be completed prior to the issuance of the COL to avoid COD delay.

For all practical purposes, the activities associated with the Pre-Construction and Site Preparation were concluded in 2015. Prior to the 2015 period biennial costs were consistently in the $2-4M range. Beginning in 2015 these biennial costs dropped to $200-$500K range and further decreased to $40K range by 2017. However, there are on-going activities in this category in order to maintain the site conditions and provide on-site security.

Section 3.5 – SUPPLY CHAIN, CONSTRUCTION PLANNING, & DETAILED ENGINEERING –

> The category of supply Chain, Construction Planning, & Detailed Engineering "includes activities associated with working with the supplier to negotiate an Engineering, Procurement and Construction (EPC) agreement. Negotiations in 2008 did not result in an executed contract. Conceptual site specific engineering and construction planning activities necessary to develop a complete project definition are included in this category. Continuing construction planning activities serve to further develop construction plans and keep the construction plans in line with latest engineering. Detailed site specific engineering began in January 2011 and was brought to 70% completion in December 2013. Commercial building design activities started in June 2012. Design of the first six commercial buildings was completed in December 2013."

This category should be sub-categorized rather evaluated broadly. The three topics in the category heading are sufficiently different to warrant individual focus The Supply Chain deals primarily with the contracting activities whether it be one Engineer, Procure, and Construction ("EPC") contract, or several individual contracts managed by a General Contractor ("GC"). DEC originally intended to sign an EPC contract. The Westinghouse Consortium was contemplated as the best EPC choice based on knowledge, cost and expertise, but DEC could not come to a final resolution with Westinghouse on an EPC contract. Therefore, DEC acted as its own GC and initiated DEC's own work schedule with contract assistance from Westinghouse, Shaw, Stone & Webster and CB&I, all members of the Westinghouse Consortium. Contracts for major installed equipment and large forgings were also covered under the Supply Chain. Many of these were to be constructed by international manufacturers such as Doosan (Korea), Mangiarotti (Italy), and Japan Steel Works, requiring extensive lead time and Supply Chain Management. Because DEC was unsuccessful with negotiating an EPC contract, it was DEC's responsibility to develop the necessary policies and procedures for supply chain activities, including everything from international communications to in-country deliveries, as well as nuclear quality assurance and quality control ("QA/QC").

Construction Planning is a huge and very costly undertaking on its own. Within Construction Planning resides the scheduling responsibility that must be integrated with all craft and contract labor, equipment purchases, site development, operational planning, design engineering, and NRC Licensing. Construction Planning touches all phases of project deployment. As such, it was essential to assign significant resources from the very first moment this project was conceived. Even with the Notice to

Cancel in August of 2017, Construction Planning activities are still on-going to assist with shutting down the project. Simply "closing the door" and walking away is not an option.

The Detailed Engineering function is self-evident. The number of design activities associated with a project of this magnitude is vast. As a result, the interface between engineering, supply chain, and construction planning is critical.

The total dollars accruing to the Supply Chain, Construction Planning, and Design Engineering through the Notice to Cancel is $57M. This cost tracks consistently with the Vogtle and Summer sites for work accomplished in similar project periods. Nevertheless, there are some significant differences between the WSL site and the Summer and Vogtle sites. One of the major differences is that both Summer and Vogtle sites executed an EPC contract, while WSL did not. DEC's failure to successfully negotiate an EPC contract was not a result of lack of effort on its part, however. In fact, a primary stumbling block to negotiating a successful EPC contract was the inability of Westinghouse to resolve issues it had with the transfer of intellectual property. The intellectual property in this case was analogous to the owner's manual for an automobile. A utility owner of a nuclear plant, in this case DEC, needs all pertinent documentation, not just bits and pieces. This issue is still on-going today with both the Summer and Vogtle projects.

Section 3.6 – OPERATIONAL PLANNING –

> The Operational Planning process "includes activities associated with operator and plant staff training, including costs associated with the Knowledge and Abilities Catalog, required for operator license examinations for AP 1000 plants, and the standardization of the nomenclature in the Westinghouse Master Equipment List (MEL). Continuing activities include: supporting operations program development, such as Quality Assurance (QA) Program, and the review of approximately 500 procedures. The training materials, operational programs, and operating procedures are all being developed in concert with other AP 1000 utilities within the APOG framework. The *Operational Planning* category also includes generation of administrative procedures that must be in place upon receipt of COL from NRC."

Operational Planning is a critical component of the nuclear construction process. Typically, the operational planning component focuses on preparing human logistics for the long-term operations of the commercial plant. This involves the development of hundreds if not thousands of operating procedures detailing the application for every piece of equipment from the water coolers to the turbines

and generators, and thousands of subsets of each. As soon as a utility determines the technology it will deploy, the operational planning effort begins. The effort and the man-power requirements of the Operational Planning section continue to increase up to the point that actual plant operators are brought on-board to begin training. This effort begins very early in the pre-construction phase, as the first set of operators to be trained are actually being "trained to train" the next generation of operators. The training effort for the WSL plant began during the COL Application period. The COL Application must contain discussions of and commitments for Operational Planning. Upon receipt of the COL, there was a marked increase in the Operational Planning budget in order to ramp up the planning process because DEC's intent was to move forward with the project. As soon as the DEC decision was made to terminate the project, the Operational Planning budget dropped rapidly beginning in 2017. The $16.5M incurred to date for Operational Planning was well within the budgets of other plants we have reviewed at a similar stage of development.

Section 3.7 –POST COL –

A Combined Construction Permit and Operating License (COL) was received for the Lee AP 1000 Project in December 2016. Design finalization and first-of-a-kind construction issues at the lead plants (Summer 2 and 3, Vogtle 3 and 4) have required Westinghouse to make numerous changes to the AP 1000 design. Design changes continue to be issued as the lead plants advance towards completion. Submittal of an annual FSAR update and recurring regulatory reporting are required to maintain the COL.

The category of Post-COL was established to capture on-going costs associated with the continuing support of the COL.

The Post-COL category has only recently been added to DEC's cost documentation. Its first entry was included for the period of January 1, 2017 through June 30, 2017. As the description provides, this category captures costs associated with on-going COL activities, primarily changes and updates to the certified design document as a result of "lessons learned" at the Vogtle and Summer sites. It also includes the necessary revision and annual submittal of the FSAR. It is difficult, if not impossible, to accurately forecast a budget for this category as it is not known what might be found at the Vogtle and Summer sites that must be modified and subjected to the FSAR review. However, as long as DEC maintains the COL and as long as there is construction progress at the Vogtle or Summer sites, Post-COL costs will be incurred.

Section 3.8 – AFUDC -

The cost category of AFUDC is the net cost of money used for construction purposes. Critical to the determination of AFUDC is the weighted cost of money, the Return on Equity approved by the NCUC, determination of the exact start date for which AFUDC can be accrued, any temporary halt in construction, and the date at which the AFUDC is no longer allowed to accrue.

AFUDC for the WSL plant has been accruing since 2004. To compare AFUDC for one utility's project to that of another utility is simply not possible due to varying costs of money over time, different commercial ratings impact on borrowing costs, timeframe for accruing AFUDC, cashflow of dollars, and timing of the expenditures relative to each of the utilities. However, all things being equal, the total AFUDC for one utility relative to another can be compared as a data point. However, since WSL has been cancelled and Vogtle and Summer continued through the Fall of 2017, it is not advisable to make this comparison because the decisions of each utility relative to their own set of specific issues such how to proceed during bankruptcy proceedings, if the continuation will actually occur, and certainly how will future cashflow and contracts be resolved by each utility will affect the accounting of AFUDC dependent on the specific utility's decisions. The only measure of appropriateness would be an accounting analysis to make certain that DEC is using the correct interest rates, ROE, and other embedded variables. The Public Staff is conducting further analysis regarding AFUDC, including the accounting treatment, and the beginning and end dates.

SECTION 4.0 REQUEST FOR APPROVAL TO CANCEL THE W. S. LEE NUCLEAR PROJECT:

DEC received a COL from the NRC on December 19, 2016. Prior to this date, DEC had been pursuing the COL and preparing the site for construction since the early 2000's. During the period of 2008 through 2017, many externalities affected DEC's ability and need to continue the pursuit of the WSL Project. Significant among these were: sluggish economic conditions between 2008 and 2016, decreased natural gas prices as a result of the advancements of fracking technology; stagnant or in some cases, retracting forecasts of load growth; and the impact on the nuclear technology revolution as a result of the failures of Westinghouse and its subsequent filing for bankruptcy protection. Additionally, the new units under construction at the V. C. Summer Plant and the Alvin W. Vogtle Plant were not progressing as forecast, schedules were falling significantly behind, and cost overruns were beginning to critically erode their economic viability. In other words, over the last five (5) years a "perfect storm" has descended upon the nuclear industry.

Because DEC was in the midst of permitting and licensing the WSL Plant, without legislation from the North Carolina General Assembly permitting recovery of CWIP financing costs outside of a general rate case, and with no immediate prospects for the passage of any such legislation, DEC determined that while it should continue to pursue its COL, along with pre-construction activities to "maintain the status quo" (See Sub 819 Order issued August 5, 2011), it should not move forward with construction. DEC received the COL in December of 2016. Economic conditions still had not improved significantly, and with the significant scale back of carbon regulation through court delays and by the Trump Administration, the IRP process indicated the need for baseload generation, and particularly nuclear baseload generation, had been delayed until the late 2020s. Westinghouse's problems with continuing construction at the Summer and Vogtle sites were also beginning to manifest themselves during this time period. Early in 2017, Westinghouse announced it had suffered significant losses from its AP 1000 projects in the US. Finally, on March 29, 2017, Westinghouse filed for bankruptcy protection under Chapter 11. The announcement by Westinghouse and the subsequent financial issues relative to bankruptcy led to the Summer project being canceled, but the Vogtle project has recently been allowed to proceed subject to significant regulatory scrutiny to which Georgia Power/Southern Nuclear has agreed.

As a result of this perfect storm scenario, DEC elected to file the Request to Cancel the W. S. Lee Project. We believe that based on the changes to economic conditions, the Westinghouse bankruptcy, and issues being experienced at Summer and Vogtle, DEC's decision to cancel the W. S. Lee Project was, in our opinion, reasonable and prudent. Therefore, it is our opinion, to the extent that Commission approval of DEC's decision to cancel the W. S. Lee project is required (which would require a legal opinion beyond the scope of our expertise or employment), that the Request to Cancel the W. S. Lee Plant be approved. We note that currently, DEC has a viable COL for the W. S. Lee project and has the site under its ownership. There are significant pre-construction activities completed and design documents completed. The project could be resurrected should all of the concerns previously identified be positively addressed.

Appendix: Qualifications of Global Energy & Water Consulting, LLC

MARK W. CRISP – PROJECT MANAGER

Mark W. Crisp is Managing Consultant with Global Energy & Water Consulting, LLC. His 35+ years of experience in the electric and water utility industry covers most functional areas of these utilities including construction of water & wastewater facilities, electric generation, transmission, operations, **utility economics**, **regulatory compliance**, **policy and prudence**. He has managed projects ranging from a few million dollars to well over $9 Billion. He is recognized as an Expert in his fields throughout the US and the International community including electric restructuring, generating resource selection, renewable energy in the form of biomass, wind, PV, and hydro. He is regularly engaged to provide immediate solutions. He has successfully guided clients through such issues as **wholesale and retail electric accounting issues**, unbundling of services, FERC open access transmission, **integrated resource planning ("IRP")**, FERC and NRC licensing, as well as, fuel hedging strategies. Mr. Crisp is a recognized expert on utility issues and has provided expert witness and testimony before several state regulatory bodies, the FERC, the NRC, Federal and State courts, and the US Congress.

Mr. Crisp, teaming with longtime partner Mr. George Evans, has most recently completed the review, analysis and acknowledgment of the IRP's submitted to the Arizona Corporation Commission for the first review under the newly approved IRP Rules in Arizona. This analysis included the review of IRP's submitted by Arizona Public Service, Tucson Electric, UNS Electric, Inc., and Arizona Electric Power Cooperative, Inc. The process in Arizona is very similar to the requirements in Louisiana in that we performed the review of the IRP's, facilitated public input sessions, evaluated not only conventional resource planning but also included demand-side management, renewable requirements of the State and transmission.

Mr. Crisp is a "hands-on" consultant having spent 20 years of his career working for Electric Utilities. His experience includes clients and projects around the world. The following sample of engagements is indicative of Mark's diverse skills and breadth of experience.

- **State Regulatory bodies in Arizona, Connecticut, Georgia, Maryland, South Carolina, Mississippi, Arizona and Utah**
- Southeastern Federal Power Customers (Group of Electric Cooperatives and Municipal Electric systems throughout the Southeastern US)
- El Paso Electric Company
- Northeast Utilities
- Niagara Mohawk
- City of Walla Walla, Washington
- City of LaGrange, Georgia
- City of Litchfield Park, Arizona
- City of North Little Rock, Arkansas
- City of Ocala, Florida
- International Privatization of Utility Assets in Argentina, Brazil, Chile, Ecuador, Nicaragua, Australia and Europe
- Puerto Rican Electric Authority ("PREPA")
- Tennessee Valley Authority ("TVA")
- South Texas Electric Cooperative ("STEC")
- GLOBALCON Holdings
- Highland Nigeria Limited
- Highland Energy Solution Services Limited
- Oglethorpe Power Corporation ("OPC")
- Grand River Dam Authority ("GRDA")
- US DOE and US DoD
- Utility Privatization for Marine Corps and Navy Bases throughout California, Arizona and Nevada

Mark has Bachelor degrees in Civil and Electrical Engineering from the Georgia Institute of Technology ("Ga. Tech") along with Master of Business Administration (Finance and Accounting) from the University of Arkansas at Little Rock.

Mark is a registered professional engineer in the States of Georgia, Florida and South Carolina.

Power Plant Experience:

Nuclear Power Generating Facilities

Plant Vogtle – Georgia Power Company (Southern Nuclear)
Plant Hatch – Georgia Power Company (Southern Nuclear)
Plant Farley – Alabama Power Company (Southern Nuclear)
Palo Verde – Arizona Public Service and Joint Owners
North Anna Power Station – Dominion Resources
Bellefonte – Tennessee Valley Authority
V. C. Summer – South Carolina Gas & Electric
Monticello Nuclear – Xcel Energy
Prairie Island Nuclear – Xcel Energy
Arkansas Nuclear 1 – Entergy Arkansas

Coal-fired Generating Facilities

Plant Bowen – Georgia Power Company
Plant Branch – Georgia Power Company
Plant Hammond – Georgia Power Company
Plant McDonough – Georgia Power Company
Plant Mitchell – Georgia Power Company
Colbun System – Chile S.A.
Mejionelles – Chile S.A.
Puerto Rican Electric Power Authority San Juan, Puerto Rico

Hydro-electric Generating Facilities (Domestic)

Wallace Dam – Georgia Power Company
Sinclair Dam – Georgia Power Company
Rocky Mountain Pumped Storage Project – Georgia Power Company
Bartlett's Ferry Dam – Georgia Power Company
Oliver Dam – Georgia Power Company
Jackson Dam – Georgia Power Company
Allatoona Dam – U.S. Army Corps of Engineers

Buford Dam – U.S. Army Corps of Engineers
Carter's Dam – U.S. Army Corps of Engineers
Hartwell Dam – U.S. Army Corps of Engineers
Richard Russell Pumped Storage Project – U.S. Army Corps of Engineers
Strom Thurmond Dam – U.S. Army Corps of Engineers
West Point Dam – U.S. Army Corps of Engineers
W. F George Dam – U.S. Army Corps of Engineers
Jim Woodruff Dam – U.S. Army Corps of Engineers
Wolf Creek Dam – U.S. Army Corps of Engineers
Center Hill Dam – U.S. Army Corps of Engineers
Texoma Dam – U.S. Army Corps of Engineers
Dennison Dam – U.S. Army Corps of Engineers
Amistad Dam – International Boundary Waters Commission
Falcon Dam – International Boundary Waters Commission

Hydro-electric Generating Facilities (International)

Alicura - Argentina
Piedra del Aquila - Argentina
El Chocon - Argentina
El Chanar - Argentina
Cerros Coloradas - Argentina
Los Reyunes - Argentina
Copalar – Nicaragua
El Toro - Argentina
El Tigre - Argentina
Los Nihuiles - Argentina
Pichi Picun Lefue - Argentina
Yacereta – Argentina & Paraguay
Itaipu – Argentina – Paraguay
Undeveloped Sites in Ecuador
Undeveloped Sites in Sub-Saharan Africa

Renewable Energy Projects (Domestic)

Milam Tennessee – Waste to Energy - Green Power Inc.
Wyoming Wind
Milledgeville, GA. Waste To Energy and PV - SolarZone, LLC

Renewable Energy Projects (International)

Haiti Reconstruction
Lagos, Nigeria WTE
Nigeria Transitional Gas Power Plant

Testimony and Expert Witness

State of Arizona Corporation Commission
State of South Carolina Public Service Commission
State of Georgia Public Service Commission
State of Mississippi Public Service Commission
State of Maryland Public Service Commission
State of Utah Public Utilities Commission
Federal Energy Regulatory Commission
Nuclear Regulatory Commission
United States Congress
Federal District Court of Washington D.C.
5th Circuit Court of Appeals – Washington DC
Federal District Court in the Northern District of Georgia
Federal District Court in the Northern District of Alabama
US Court of Appeals - 11th Circuit

Abbreviated List of Testimony and Filings before State Regulatory Bodies

Arizona Commerce Commission DOCKET NO. E-00000A-11-0113, December 2012

Review and Analysis of the Integrated Resource Plans of Arizona Public Service Company, Tucson Electric Power Company, UNS Electric, Inc., and Arizona Electric Power Cooperative, Inc.

Arizona Commerce Commission DOCKET NO. E-00000V-13-0070, December 2014

Review and Analysis of the Integrated Resource Plans of Arizona Public Service Company, Tucson Electric Power Company, UNS Electric, Inc., and Arizona Electric Power Cooperative, Inc.

South Carolina Office of Regulatory Staff DOCKET NO. 2008-196-E, October 2008

Review and Determination of Approval of a Combined Application of SCE&G for the Construction and Operation of Units 2 & 3 at V.C. Summer Nuclear Facility

South Carolina Office of Regulatory Staff DOCKET NO. 2009-293-E, September 2009

Update of Construction Progress and Request for Updates and Revisions to Schedules Related to the Construction of V.C. Summer Units 2 & 3 Nuclear Base Load Generation Facility

South Carolina Office of Regulatory Staff DOCKET NO. 2010-376-E, February 2011

Petition of South Carolina Electric & Gas Company for Updates and Revisions to Schedules Related to the Construction of V.C. Summer Units 2 & 3 Nuclear Base Load Generation Facility

Minnesota Department of Commerce, Energy Resources Division, DOCKET NO. E002/CI-13-754, July 2014,

Investigation into Xcel Energy's Monticello Nuclear Plant Life Cycle Management/Extended Power Uprate Project and Request for Recovery of Cost Overruns

City of Miami, Florida Office of the City Attorney, DOCKET NO. 52-040 & 52-041, May 2017

Affidavit Before the Nuclear Regulatory Commission ("NRC") In the Matter of Florida Power & Light's Turkey Point Unit 6 & 7 Combined Operating License

Utah Division of Public Utilities, DOCKET NO. 10-035-124, May 2011

In the Matter of the Application of Rocky Mountain Power For Authority to Increase its Retail Electric Utility Service rates in Utah and for Approval of its Proposed Electric Service Schedules and Electric Service Regulations.

Mississippi Public Utilities Staff, DOCKET NO. 2010-UA-374, July 2013

Entergy Mississippi, Inc. Application for Approval of Accounting Treatment for Grand Gulf 3; "Costs Incurred in Connection with Generation Resource Planning, Evaluation, Monitoring, and Development of Activities Related to Grand Gulf 3"

Staff of the Georgia Public Service Commission, DOCKET NO. 17687-U, April 2004

Georgia Power Company's Application for Approval of its 2004 Integrated Resource Plan

Staff of the Georgia Public Service Commission, DOCKET NO. 17688-U, April 2004

Savannah Electric and Power Company's Application for Approval of its 2004 Integrated Resource Plan

Staff of the Georgia Public Service Commission, DOCKET NO. 24505-U, April 2007

Georgia Power Company's Application for Approval of its 2007 Integrated Resource Plan

William R. Jacobs, Jr.
Executive Consultant

EDUCATION: Ph.D., Nuclear Engineering, Georgia Tech 1971

MS, Nuclear Engineering, Georgia Tech 1969

BS, Mechanical Engineering, Georgia Tech 1968

ENGINEERING REGISTRATION: Registered Professional Engineer

PROFESSIONAL MEMBERSHIP: American Nuclear Society

EXPERIENCE:

Dr. Jacobs has over thirty-five years of experience in a wide range of activities in the electric power generation industry. He has extensive experience in the construction, startup and operation of nuclear power plants. While at the Institute of Nuclear Power Operation (INPO), Dr. Jacobs assisted in development of INPO's outage management evaluation group. He has provided expert testimony related to nuclear plant operation and outages in Texas, Louisiana, South Carolina, Florida, Wisconsin, Indiana, Georgia and Arizona. He currently provides nuclear plant operational monitoring services for GDS clients. Dr. Jacobs was a witness in nuclear plant certification hearings in Georgia for the Plant Vogtle 3 and 4 project on behalf of the Georgia Public Service Commission and in South Carolina for the V.C. Summer 2 and 3 projects on behalf of the South Carolina Office of Regulatory Staff. His areas of expertise include evaluation of reactor technology, EPC contracting, risk management and mitigation, project cost and schedule. He is assisting the Florida Office of Public Counsel in monitoring the development of four new nuclear units in the State of Florida, Levy County Units 1 and 2 and Turkey Point Units 6 and 7. He also evaluated extended power uprates on five nuclear units for the Florida Office of Public Counsel. He has been selected by the Georgia Public Service Commission as the Independent Construction Monitor for Georgia Power Company's new AP1000 nuclear power plants, Plant Vogtle Units 3 and 4. He has assisted the Georgia Public Service Commission staff in development of energy policy issues related to supply-side resources and in evaluation of applications for certification of power generation projects and assists the staff in monitoring the construction of these projects. He has also assisted in providing regulatory oversight related to an electric utility's evaluation of responses to an RFP for a supply-side resource and subsequent negotiations with short-listed bidders. He has provided technical litigation support and expert testimony support in several complex law suits involving power generation facilities. He monitors power plant operations for GDS clients and has provided testimony on power plant operations and decommissioning in several jurisdictions. Dr. Jacobs represents a GDS client on the management committee of a large coal-fired power plant currently under construction. Dr. Jacobs has provided testimony before the Georgia Public Service Commission, the Public Utility Commission of Texas, the North Carolina Utilities Commission, the South Carolina Public Service Commission, the Iowa State Utilities Board, the Louisiana Public Service Commission, the Florida Public Service Commission,

the Indiana Regulatory Commission, the Wisconsin Public Service Commission, the Arizona Corporation Commission and the FERC.

A list of Dr. Jacobs' testimony is available upon request.

1986-Present GDS Associates, Inc.

As Executive Consultant, Dr. Jacobs assists clients in evaluation of management and technical issues related to power plant construction, operation and design. He has evaluated and testified on combustion turbine projects in certification hearings and has assisted the Georgia PSC in monitoring the construction of the combustion turbine projects. Dr. Jacobs has evaluated nuclear plant operations and provided testimony in the areas of nuclear plant operation, construction prudence and decommissioning in nine states. He has provided litigation support in complex law suits concerning the construction of nuclear power facilities. Dr. Jacobs is the Georgia PSC's Independent Construction Monitor for the Plant Vogtle 3 and 4 nuclear project.

1985-1986 Institute of Nuclear Power Operations (INPO)

Dr. Jacobs performed evaluations of operating nuclear power plants and nuclear power plant construction projects. He developed INPO Performance Objectives and Criteria for the INPO Outage Management Department. Dr. Jacobs performed Outage Management Evaluations at the following nuclear power plants:

- Connecticut Yankee - Connecticut Yankee Atomic Power Co.
- Callaway Unit I - Union Electric Co.
- Surry Unit I - Virginia Power Co.
- Ft. Calhoun - Omaha Public Power District
- Beaver Valley Unit 1 - Duquesne Light Co.

During these outage evaluations, he provided recommendations to senior utility management on techniques to improve outage performance and outage management effectiveness.

1979-1985 Westinghouse Electric Corporation

As site manager at Philippine Nuclear Power Plant Unit No. 1, a 655 MWe PWR located in Bataan, Philippines, Dr. Jacobs was responsible for all site activities during completion phase of the project. He had overall management responsibility for startup, site engineering, and plant completion departments. He managed workforce of approximately 50 expatriates and 1700 subcontractor personnel. Dr. Jacobs provided day-to-day direction of all site activities to ensure establishment of correct work priorities, prompt resolution of technical problems and on schedule plant completion.

Prior to being site manager, Dr. Jacobs was startup manager responsible for all startup activities including test procedure preparation, test performance and review and acceptance of test results. He established the system turnover program, resulting in a timely turnover of systems for startup testing.

As startup manager at the KRSKO Nuclear Power Plant, a 632 MWE PWR near Krsko, Yugoslavia, Dr. Jacobs' duties included development and review of startup test procedures, planning and coordination of all startup test activities, evaluation of test results and customer assistance with regulatory questions. He had overall responsibility for all startup testing from Hot Functional Testing through full power operation.

1973 - 1979 NUS Corporation

As Startup and Operations and Maintenance Advisor to Korea Electric Company during startup and commercial operation of Ko-Ri Unit 1, a 595 MWE PWR near Pusan, South Korea, Dr. Jacobs advised KECO on all phases of startup testing and plant operations and maintenance through the first year of commercial operation. He assisted in establishment of administrative procedures for plant operation.

As Shift Test Director at Crystal River Unit 3, an 825 MWE PWR, Dr. Jacobs directed and performed many systems and integrated plant tests during startup of Crystal River Unit 3. He acted as data analysis engineer and shift test director during core loading, low power physics testing and power escalation program.

As Startup engineer at Kewaunee Nuclear Power Plant and Beaver Valley, Unit 1, Dr. Jacobs developed and performed preoperational tests and surveillance test procedures.

1971 - 1973 Southern Nuclear Engineering, Inc.

Dr. Jacobs performed engineering studies including analysis of the emergency core cooling system for an early PWR, analysis of pressure drop through a redesigned reactor core support structure and developed a computer model to determine tritium build up throughout the operating life of a large PWR.

SIGNIFICANT CONSULTING ASSIGNMENTS:

Georgia Public Service Commission – Selected as the Independent Construction Monitor to assist the GPSC staff in monitoring all aspects of the design, licensing and construction of Plant Vogtle Units 3 and 4, two AP1000 nuclear power plants.

Georgia Public Service Commission – Assisted the Georgia Public Service Commission Staff and provided testimony related to the evaluation of Georgia Power Company's request for certification to construct two AP1000 nuclear power plants at the Plant Vogtle site.

South Carolina Office of Regulatory Staff – Assisted the South Carolina Office of Regulatory Staff in evaluation of South Carolina Electric and Gas' request for certification of two AP1000 nuclear power plants at the V.C. Summer site.

Florida Office of Public Counsel – Assists the Florida Office of Public Counsel in monitoring the development of four new nuclear power plants and extended power uprates on five nuclear units in Florida including providing testimony on the prudence of expenditures.

East Texas Electric Cooperative – Represented ETEC on the management committee of the Plum Point Unit 1 a 650 Mw coal-fired plant under construction in Osceola, Arkansas and represents ETEC on the management committee of the Harrison County Power Project, a 525 Mw combined cycle power plant located near Marshall, Texas.

Arizona Corporation Commission – Evaluated operation of the Palo Verde Nuclear Generating Station during the year 2005. Included evaluation of 11 outages and providing written and oral testimony before the Arizona Corporation Commission.

Citizens Utility Board of Wisconsin – Evaluated Spring 2005 outage at the Kewaunee Nuclear Power Plant and provided direct and surrebuttal testimony before the Wisconsin Public Service Commission.

Georgia Public Service Commission - Assisted the Georgia PSC staff in evaluation of Integrated Resource Plans presented by two investor owned utilities. Review included analysis of purchase power agreements, analysis of supply-side resource mix and review of a proposed green power program.

State of Hawaii, Department of Business, Economic Development and Tourism – Assisted the State of Hawaii in development and analysis of a Renewable Portfolio Standard to increase the amount of renewable energy resources developed to meet growing electricity demand. Presented the results of this work in testimony before the State of Hawaii, House of Representatives.

Georgia Public Service Commission - Assisted the Georgia PSC staff in providing oversight to the bid evaluation process concerning an electric utility's evaluation of responses to a Request for Proposals for supply-side resources. Projects evaluated include simple cycle combustion turbine projects, combined cycle combustion turbine projects and co-generation projects.

Millstone 3 Nuclear Plant Non-operating Owners – Evaluated the lengthy outage at Millstone 3 and provided analysis of outage schedule and cost on behalf of the non-operating owners of Millstone 3. Direct testimony provided an analysis of additional post-outage O&M costs that would result due to the outage. Rebuttal testimony dealt with analysis of the outage schedule.

H.C. Price Company – Evaluated project management of the Healy Clean Coal Project on behalf of the General Contractor, H.C. Price Company. The Healy Clean Coal Project is a 50 megawatt coal burning power plant funded in part by the DOE to demonstrate advanced clean coal technologies. This project involved analysis of the project schedule and evaluation of the impact of the owner's project management performance on costs incurred by our client.

Steel Dynamics, Inc. – Evaluated a lengthy outage at the D.C. Cook nuclear plant and presented testimony to the Indiana Utility Regulatory Commission in a fuel factor adjustment case Docket No. 38702-FAC40-S1.

Florida Office of Public Counsel - Evaluated lengthy outage at Crystal River Unit 3 Nuclear Plant. Submitted expert testimony to the Florida Public Service Commission in Docket No. 970261-EI.

United States Trade and Development Agency - Assisted the government of the Republic of Mauritius in development of a Request for Proposal for a 30 MW power plant to be built on a Build, Own, Operate (BOO) basis and assisted in evaluation of Bids.

Louisiana Public Service Commission Staff - Evaluated management and operation of the River Bend Nuclear Plant. Submitted expert testimony before the LPSC in Docket No. U-19904.

U.S. Department of Justice - Provided expert testimony concerning the in-service date of the Harris Nuclear Plant on behalf of the Department of Justice U.S. District Court.

City of Houston - Conducted evaluation of a lengthy NRC required shutdown of the South Texas Project Nuclear Generating Station.

Georgia Public Service Commission Staff - Evaluated and provided testimony on Georgia Power Company's application for certification of the Intercession City Combustion Turbine Project - Docket No. 4895-U.

Seminole Electric Cooperative, Inc. - Evaluated and provided testimony on nuclear decommissioning and fossil plant dismantlement costs - FERC Docket Nos. ER93-465-000, et al.

Georgia Public Service Commission Staff - Evaluated and prepared testimony on application for certification of the Robins Combustion Turbine Project by Georgia Power Company - Docket No. 4311-U.

North Carolina Electric Membership Corporation - Conducted a detailed evaluation of Duke Power Company's plans and cost estimate for replacement of the Catawba Unit 1 Steam Generators.

Georgia Public Service Commission Staff - Evaluated and prepared testimony on application for certification of the McIntosh Combustion Turbine Project by Georgia Power Company and Savannah Electric Power Company - Docket No. 4133-U and 4136-U.

New Jersey Rate Counsel - Review of Public Service Electric & Gas Company nuclear and fossil capital additions in PSE&G general rate case.

Corn Belt Electric Cooperative/Central Iowa Power Electric Cooperative - Directs an operational monitoring program of the Duane Arnold Energy Center (565 Mwe BWR) on behalf of the non-operating owners.

Cities of Calvert and Kosse - Evaluated and submitted testimony of outages of the River Bend Nuclear Station - PUCT Docket No. 10894.

Iowa Office of Consumer Advocate - Evaluated and submitted testimony on the estimated decommissioning costs for the Cooper Nuclear Station - IUB Docket No. RPU-92-2.

Georgia Public Service Commission/Hicks, Maloof & Campbell - Prepared testimony related to Vogtle and Hatch plant decommissioning costs in 1991 Georgia Power rate case - Docket No. 4007-U.

City of El Paso - Testified before the Public Utility Commission of Texas regarding Palo Verde Unit 3 construction prudence - Docket No. 9945.

City of Houston - Testified before Texas Public Utility Commission regarding South Texas Project nuclear plant outages - Docket No. 9850.

NUCOR Steel Company - Evaluated and submitted testimony on outages of Carolina Power and Light nuclear power facilities - SCPSC Docket No. 90-4-E.

Georgia Public Service Commission/Hicks, Maloof & Campbell - Assisted Georgia Public Service Commission staff and attorneys in many aspects of Georgia Power Company's 1989 rate case including nuclear operation and maintenance costs, nuclear performance incentive plan for Georgia and provided expert testimony on construction prudence of Vogtle Unit 2 and decommissioning costs of Vogtle and Hatch nuclear units - Docket No. 3840-U.

Swidler & Berlin/Niagara Mohawk - Provided technical litigation support to Swidler & Berlin in law suit concerning construction mismanagement of the Nine Mile 2 Nuclear Plant.

Long Island Lighting Company/Shea & Gould - Assisted in preparation of expert testimony on nuclear plant construction.

North Carolina Electric Membership Corporation - Prepared testimony concerning prudence of construction of Carolina Power & Light Company's Shearon Harris Station - NCUC Docket No. E-2, Sub537.

City of Austin, Texas - Prepared estimates of the final cost and schedule of the South Texas Project in support of litigation.

Tex-La Electric Cooperative/Brazos Electric Cooperative - Participated in performance of a construction and operational monitoring program for minority owners of Comanche Peak Nuclear Station.

Tex-La Electric Cooperative/Brazos Electric Cooperative/Texas Municipal Power Authority (Attorneys - Burchette & Associates, Spiegel & McDiarmid, and Fulbright & Jaworski) - Assisted GDS personnel as consulting experts and litigation managers in all aspects of the lawsuit brought by Texas Utilities against the minority owners of Comanche Peak Nuclear Station.

GEORGE W. EVANS – UTILITY COST AND REPLACEMENT ENERGY CONSULTANT

EDUCATION:

Master of Science, Applied Mathematics, Georgia Institute of Technology, 1976
Bachelor of Science, Applied Mathematics, Georgia Institute of Technology, 1974

PROFESSIONAL MEMBERSHIP:

Institute of Electrical and Electronic Engineers

EXPERIENCE:

Mr. Evans is the President of Evans Power Consulting, Inc. he has served the electric power utility industry for over thirty years. His primary areas of expertise include market price forecasting, integrated resource planning, the analysis of purchased power, system operations, interruptible rates, the optimal scheduling of generator maintenance, demand-side resources, and the computer simulation of electric power systems. As an expert witness in these areas, Mr. Evans has submitted testimony on over 40 occasions, before the FERC, the Georgia Public Service Commission, the Pennsylvania Public Utilities Commission, the South Dakota Public Utility Commission, the Michigan Public Service Commission, the Alabama PSC, the Mississippi PSC, the Colorado PUC, the Delaware PSC, the Utah PSC, the South Carolina PSC, and the Arkansas PSC. He is an expert in the utilization of Strategist and PROMOD and is a nationally recognized expert in the application of these simulation models.

Specific Experience Includes:

1997-2011 Slater Consulting

Golden Spread Electric Cooperative – Presented expert testimony in a FERC complaint concerning the actual operation of an economy sales agreement between Golden Spread and Southwestern Public Service Company.

Cooper Nuclear Plant - Development of the estimated damages caused by imprudent outages of a Nebraska nuclear generating unit.

Millstone 3 Nuclear Unit - Analysis of the replacement energy costs for the Millstone 3 nuclear unit on behalf of the co-owners.

Independent Power Producers - Presented expert testimony before the Alabama and Mississippi PSCs concerning the construction of new combined cycle facilities in those states.

S.C. State Energy Office - Developed a report summarizing and evaluating the Integrated Resource Plans filed by the electric utilities of South Carolina.

1989-1997 GDS Associates, Inc.

Mr. Evans served as a principal and the Manager of the System Modeling group, where he was responsible for performing analyses, providing expert testimony and developing customized software. He is an expert in the use of the industry standard computer models PROMOD III, PROSCREEN II, PROVIEW, MAINPLAN, CAT II and ENPRO. A sampling of representative assignments follows:

Tenaska, Air Liquide & Tenneco - Developed forecasts of market clearing prices for electricity in the ERCOT region.

GEMC - Produced a forecast of market clearing prices for electricity in the SERC region and estimated stranded costs.

Central Virginia Electric Cooperative - Designed, developed and installed software to allow the Cooperative to purchase economy energy in an optimal manner on a daily basis.

City of Grand Island, Nebraska - Developed the initial Integrated Resource Plan for the City of Grand Island.

Georgia PSC - Evaluated the 1995 Integrated Resource Plans filed by Georgia Power and Savannah Electric. Developed alternative Integrated Resource plans that were approved by the Commission.

Nucor Steel - Audited the bills for electric service for the Nucor-Hickman Steel Mill.

Nucor Steel - Testified before the Arkansas PSC concerning the reasonableness of a buy-through clause for interruptible customers.

Nucor Steel - Developed a comprehensive forecast of the likely levels of interruptions of service over the next ten years.

South Dakota Public Utility Commission - Evaluated the rate filing and Integrated Resource Plan filed by Black Hills Power & Light.

Georgia PSC - Evaluated Georgia Power's initial RFP for power, all bids received and Georgia Power's selection process. Testified before the Georgia PSC concerning the reasonableness of Georgia Power's evaluation process and resulting request for certification.

Michigan Attorney General - Performed studies concerning the availability of the Midland Cogeneration Venture and Consumer Power Company's avoided costs.

Michigan Attorney General - Developed estimates of cost reductions due to improved projected fossil performance and changes in cogeneration levels in a Consumers Power rate case.

Pennsylvania PUC - Testified concerning the capacity needs of a Pennsylvania utility and the appropriate avoided costs due potential cogeneration projects.

Golden Spread Electric Cooperative - Developed detailed historical reconstructions of five years of hourly operations of a major Texas utility to illustrate the penalties arising to wholesale ratepayers as a result of off-system sales.

Sam Rayburn G&T - Designed, developed and implemented a PC-based software system to facilitate daily load forecasting, optimal resource scheduling and inadvertent accounting in a user-friendly fashion.

Tex-La Electric Cooperative - Designed, developed and implemented a similar software system for daily load forecasting and optimal resource scheduling. This application also included the development of an optimization process which maximizes the total economy energy scheduled while adhering to limitations on load factor and the number of hourly changes.

PG&E-Bechtel Generating Company - Assisted this NUG developer in forecasting the dispatchability of a project and estimating likely costs in a power bidding solicitation.

1980-1989 Energy Management Associates, Inc. - now known as Ventyx

While with EMA, Mr. Evans performed product development, maintenance programming and client support on the three major products marketed and developed by EMA - PROMOD III, PROSCREEN II, and MAINPLAN. He is extremely well-versed in the development of databases for these tools and in applying these tools to particular studies.

As MAINPLAN Product Manager (1985-1989), Mr. Evans supervised and directed the development, maintenance, and client support for MAINPLAN - the software package that is the industry leader in the area of generating unit maintenance scheduling. The client base for MAINPLAN grew from two clients to over thirty clients during his involvement. Also during his tenure, a chronological production costing model was added to MAINPLAN. This highly detailed model has been used to evaluate interchange opportunities, the cost of forced outages, short-term fuel requirements and unit commitment strategies.

Publications:

Backcasting - A new computer application can determine historical truth for utilities that must refute damage claims, Fortnightly, October 1, 1993.

"Avoiding and Managing Interruptions of Electric Service under an Interruptible Contract or Tariff", Industrial Energy Technology Conference, April, 1995.

“Analysis and Evaluation of the Integrated Resource Plans of the Investor-Owned and State-Owned Electric Utilities in South Carolina”, for the South Carolina State Energy Office, April, 1998.